Fig. PA1: MAGNET-Automated Contracting System

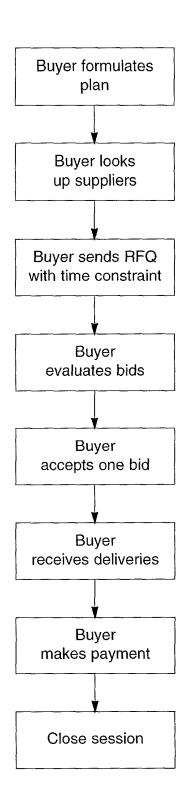


Fig. PA2: Fishmarket

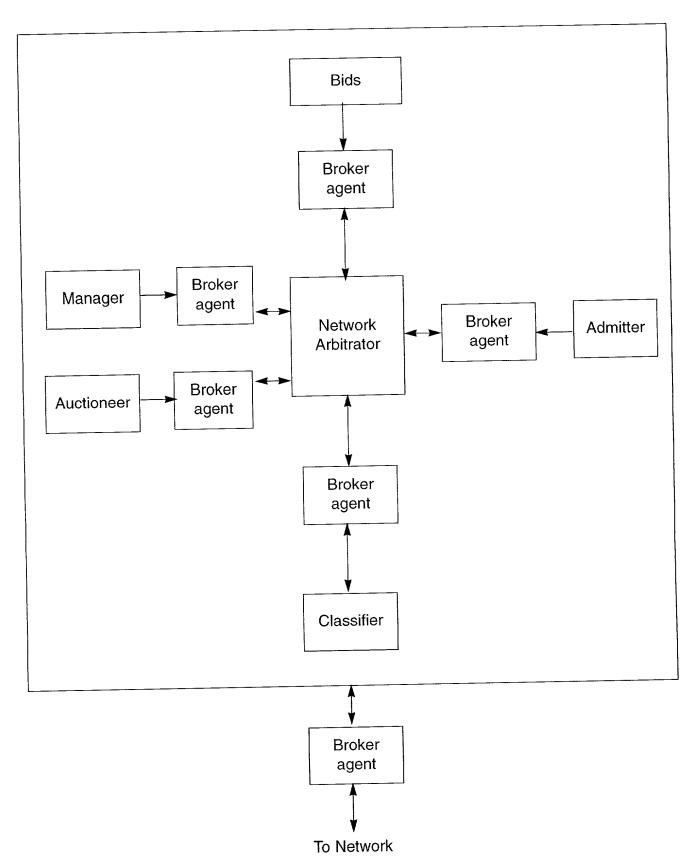


Fig. PA3: Kasbah Marketplace

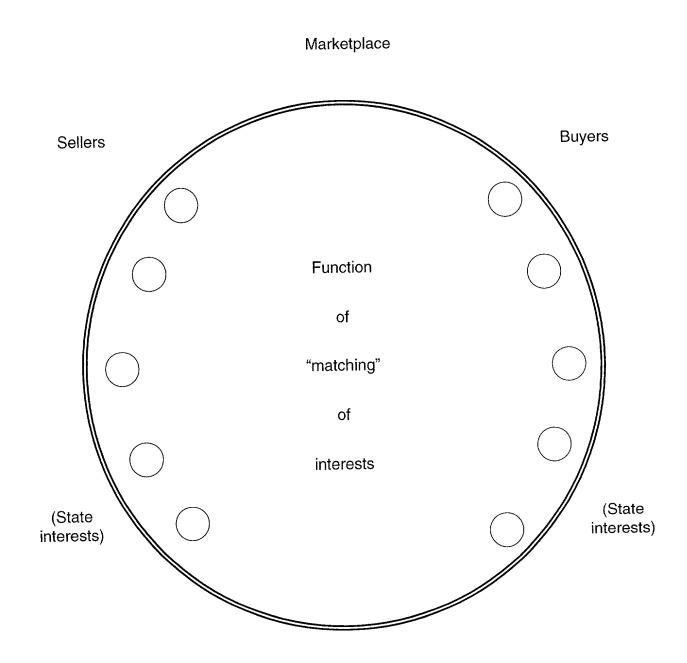


Fig. PA4A: Tete-a-tete (I): Integrative Negotiation

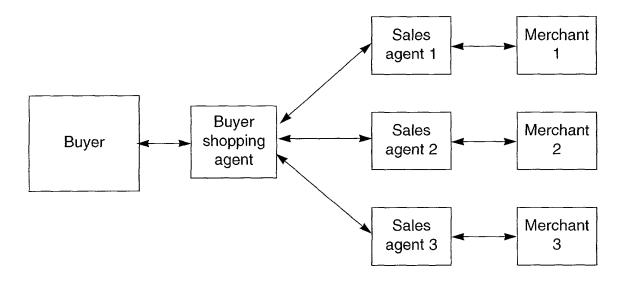


Fig. PA4B: Tete-a-tete (II): Bilateral Negotiation

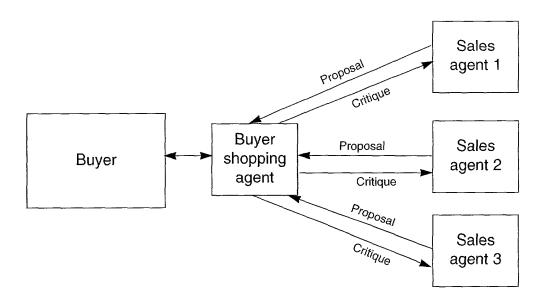


Fig. PA5: Contract Net-4 Stages of the Contract Net

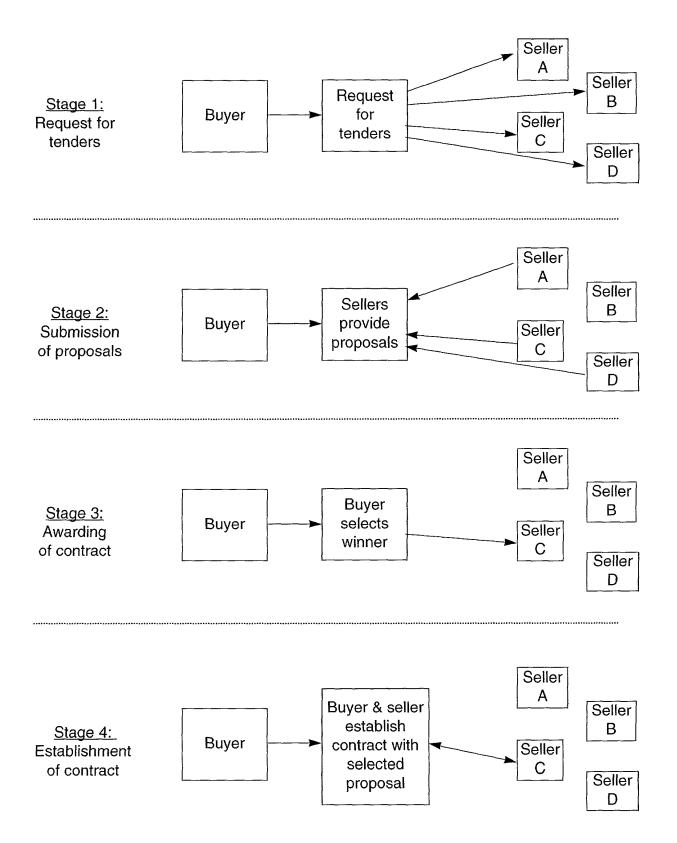


Fig. PA6: Flow Chart Of Contract Net Protocol

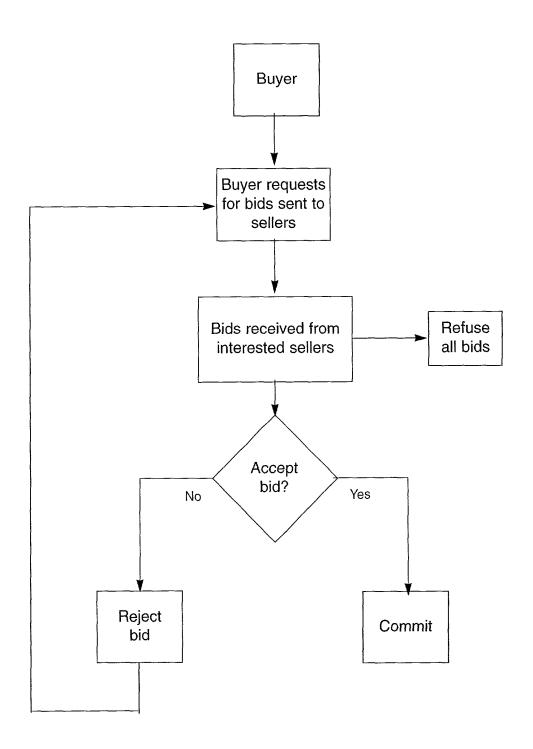


Fig. PA7A: EDI As A Paper Replacement Technique

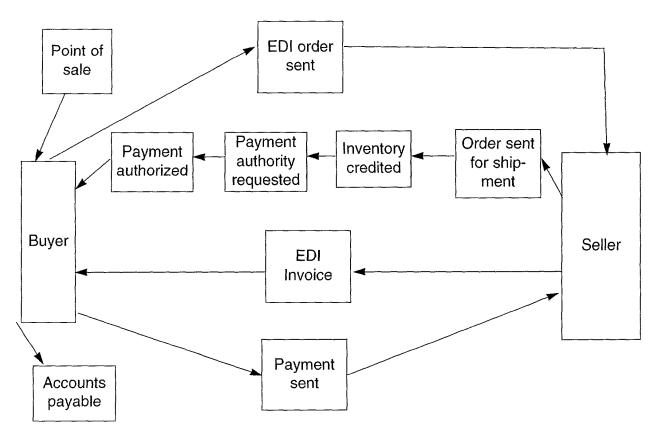
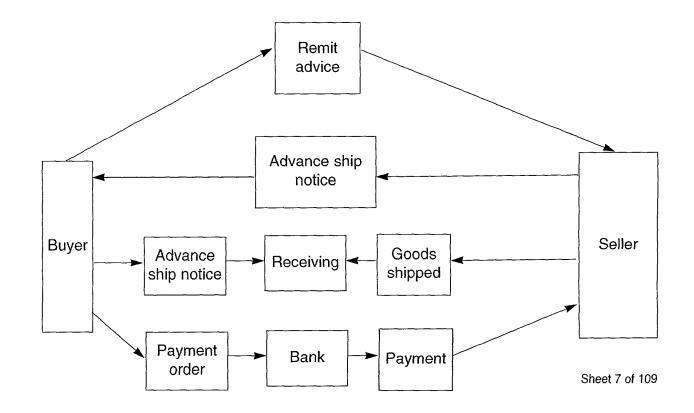


Fig. PA7B: EDI As A Process Elimination Technique



# Fig. PA8: ECN (Electronic Communications Network)

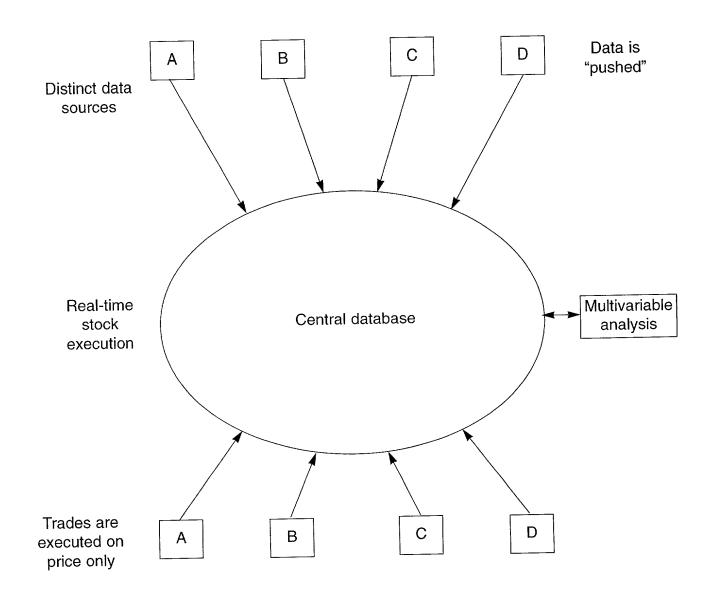
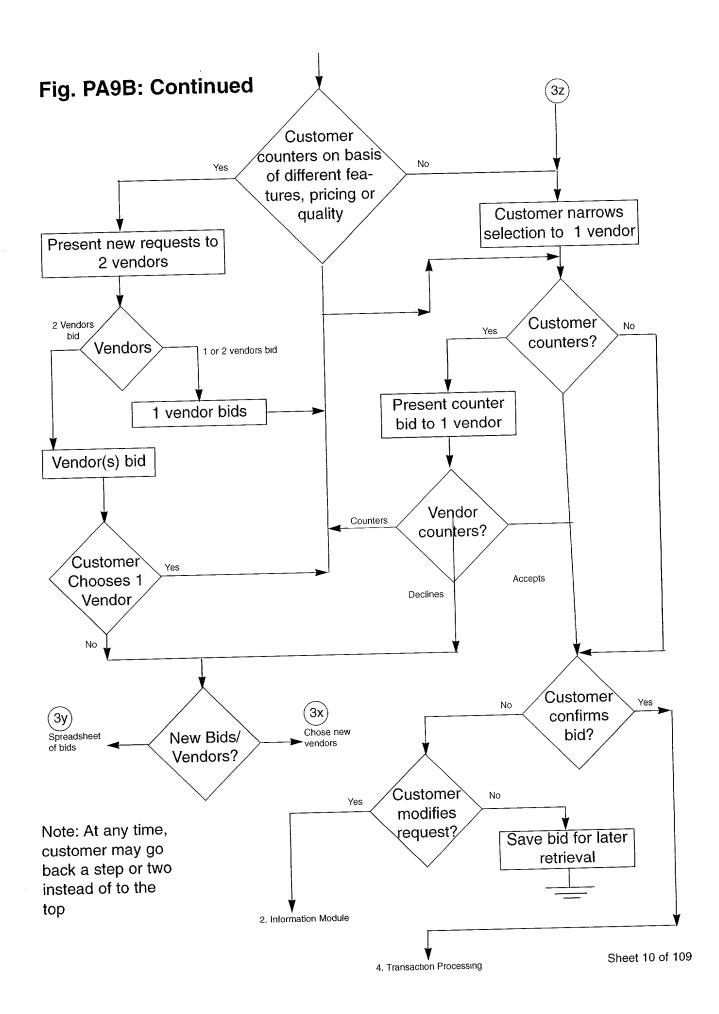


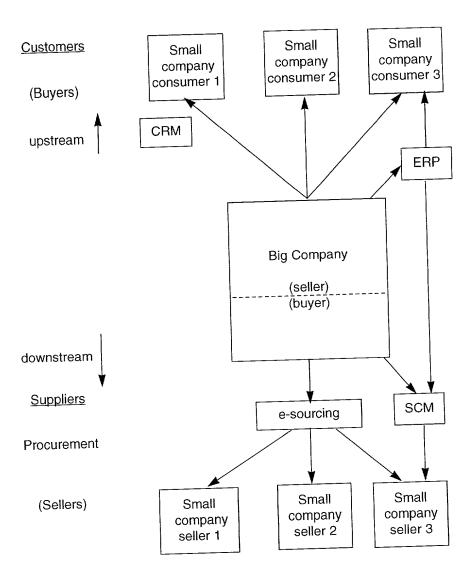
Fig. PA9A: Intermediated Demand-Initiated Procurement System III. Application II. Specific I. Specific IV. Service **Bundles** Equipment Service Bundles Selected (4a,c) Selected (5,6) Selected (1,2,3) Selected (1,2,3,4b)) **Enter Service** Enter Equipment **Enter Application Enter Service Features Features** Services Features **Features** Select at least 4 vendors from appropriate list of choices Зх System sends bid requests to at least 4 vendors M Send bid Send bid Send bid Send bid request request request request X M L/UDDI System receives bids: Software agents interact with vendor databases (may be manually overridden) or establish real time connection to vendors' databases Зу Present bids in spreadsheet comparison chart Customer narrows down to Reject all Choose different vendors at least 2 vendors, Yes

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# Fig. PA10: Traditional Supply Chain & Customer Relationships

(Small Company Consumers)



(Small Companies)

Fig. PA11: Traditional Search Technology

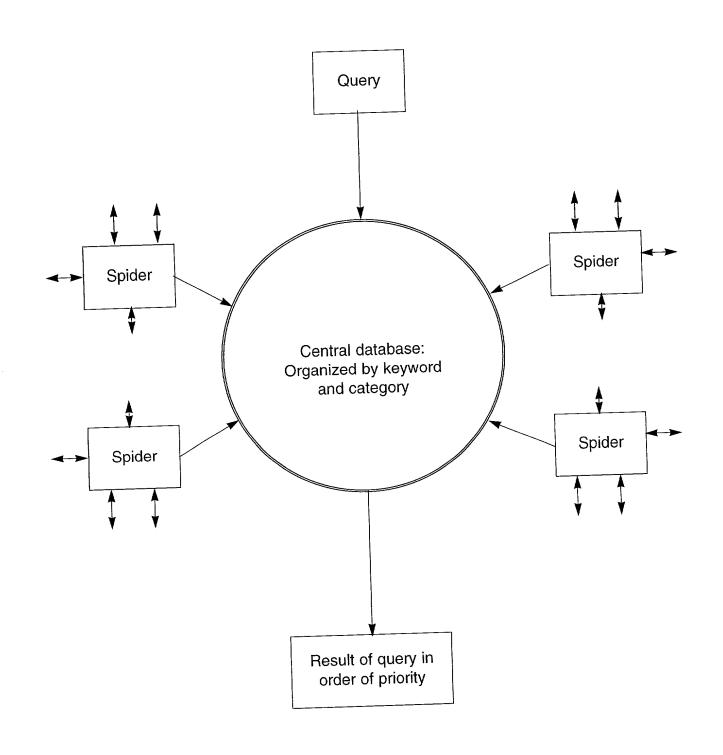
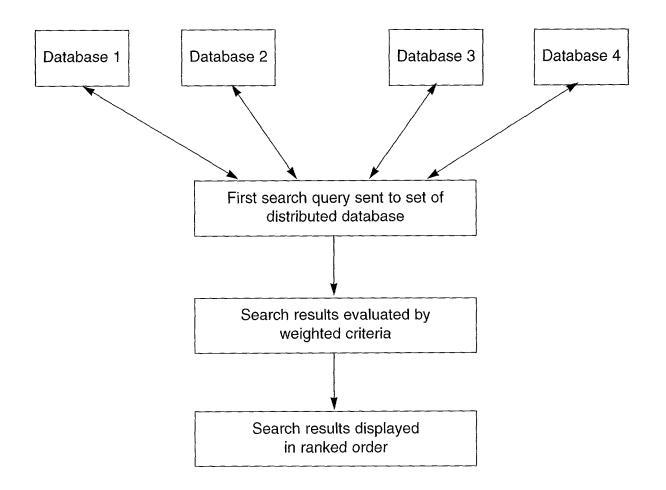


Fig. PA12: Distributed Search Approach



# Fig. PA13: Traditional Aggregation

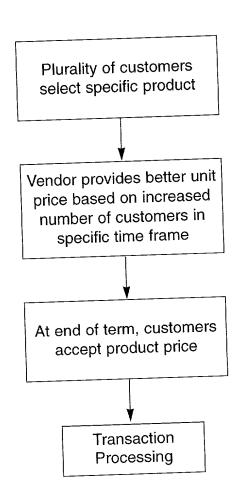
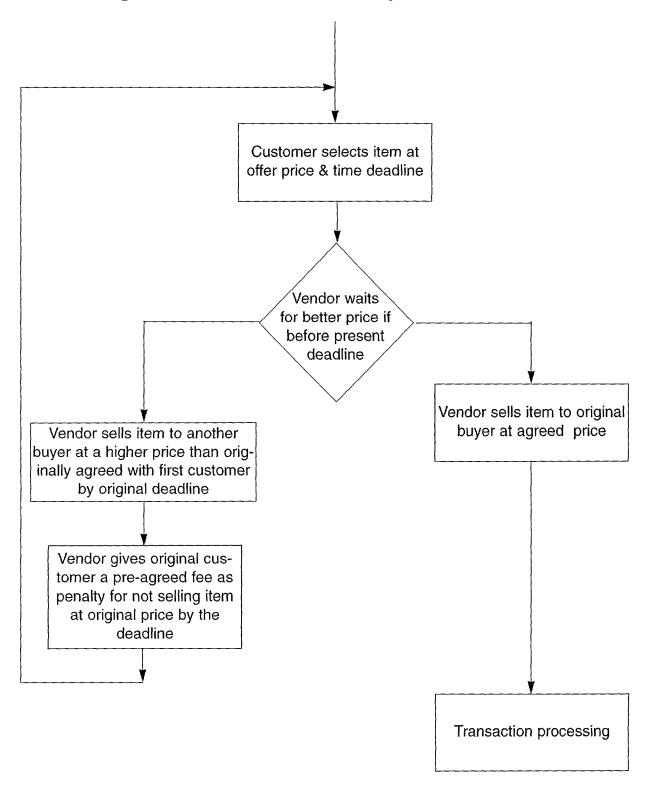


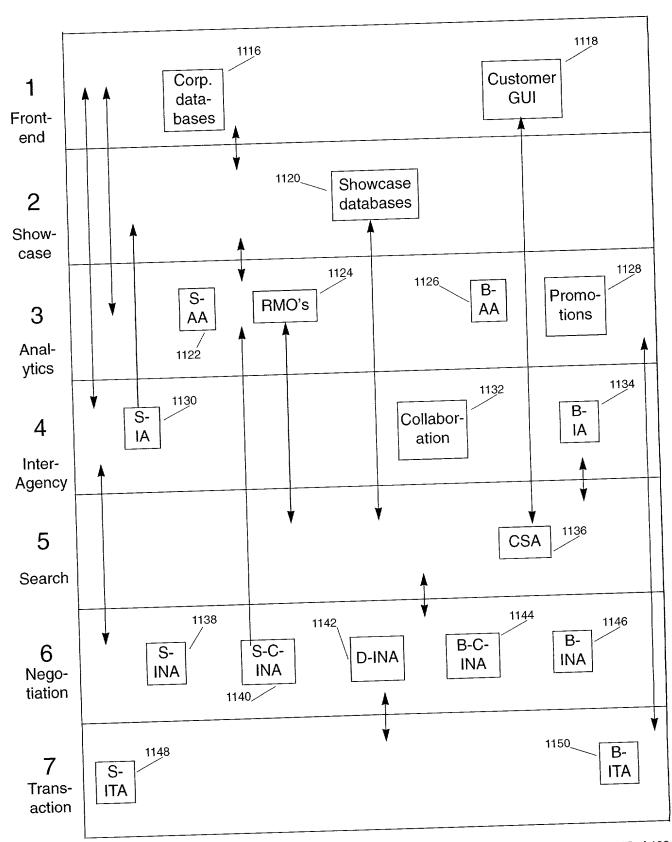
Fig. PA14: Intermediated Option Contracts



Market Data Inputs Corporate Data Inputs 1010 1005 1013 Main Corporate Buyer-AA Seller-AA 1025 Databases DB2 DB1 Firewall Set **Parameters** 1020 1030 1015 Promotion Customer 1035 & RMO **GUI** modules S-IAs Collabo 1040 ation Buyer Interagent 1050 1055 1060 1045 Pre-S-IAs negotia-Data as objects/codes tion Commercial Search Seller Site Showcases Agent (CSA) SC2 SC1 1065 1070 Price, negotia-Price, negotiation & tion & auction auction modules modules 1090 1080 1085 B-AA B-INA<sub>2</sub> B-INA 1 S-INA 2 S-INA 1 1100 1095 1075 B-ITA S-ITA \_1110 1105 1115 End Sheet 16 of 109 Transaction

Fig. 1: CCN Architecture

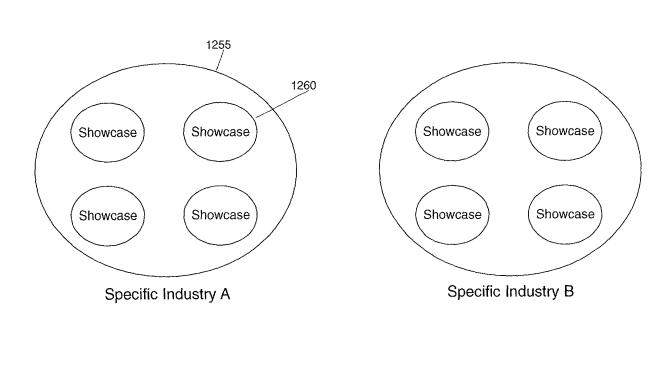
Fig. 2: CCN System Layers

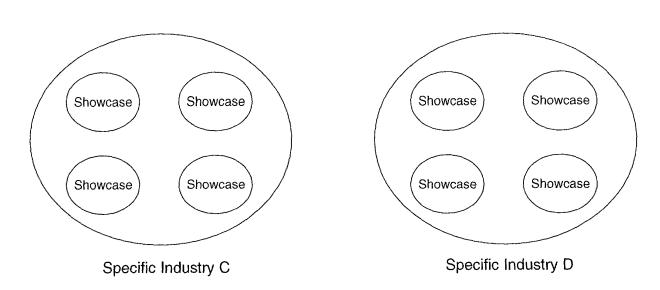


1160 1155 Corporate Data S-IA Main Corporate Showcase Database S-IA 1165 Promotion & Market Data **RMO** modules Inputs 1175 1170 Corporate Data S-IA Main Corporate Showcase S-IA Database S-IA 118<u>5</u> Price 1180 Module Seller AA 1195 1190 Corporate Data Main Corporate S-IA Showcase Database S-IA Promotion & 1200 **RMO** modules 1210 1205 Corporate Data S-IA Main Corporate Showcase S-IA Database S-IA

Fig. 3: Showcase Database System

## Fig. 4: Multiple Vertical Databases





1300 Market data 1305 sources ΑI 1315 1310 module Snapshots of S-Analytical data streams agent over time 1320 1325 GUI Corporate database S-inter-agent Purchasing ERP and SCM managers time over data Implementation fed Managers & system monitors 1330 Pricing \_1345 module 1336 1332 Showcase Promotion module Accessed from different **RMO** over cleansed locations module 1334 1310 S-AA Sheet 20 of 109

Fig. 5: Showcase Database View

Fig. 6: Showcase Database Operation

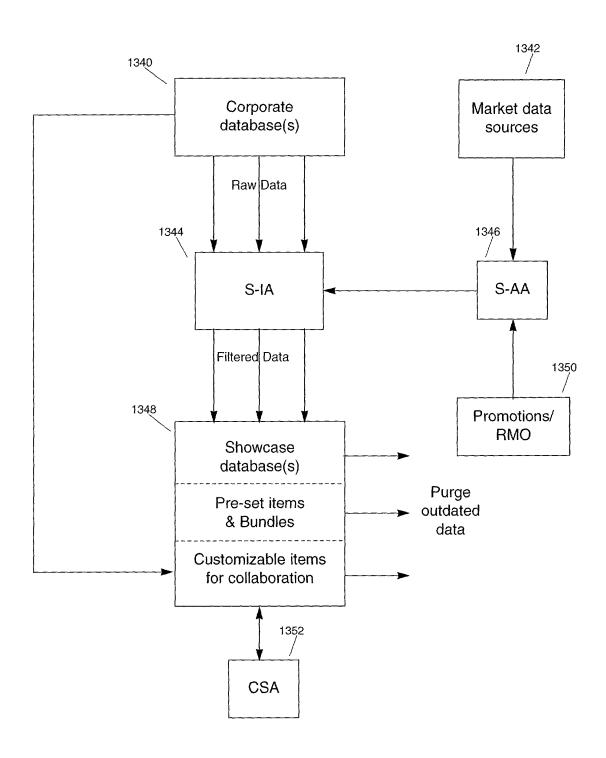


Fig. 7: Showcase Data Flow

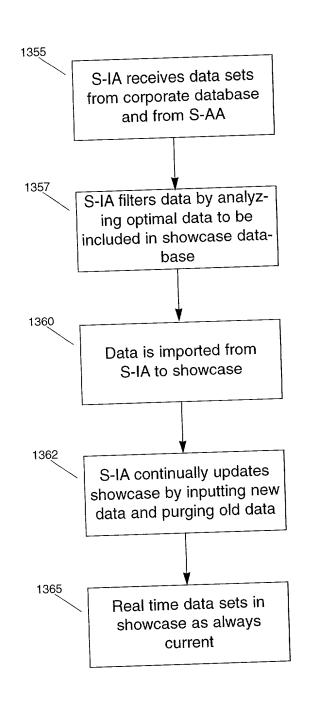


Fig. 8: Inter-agent System Architecture

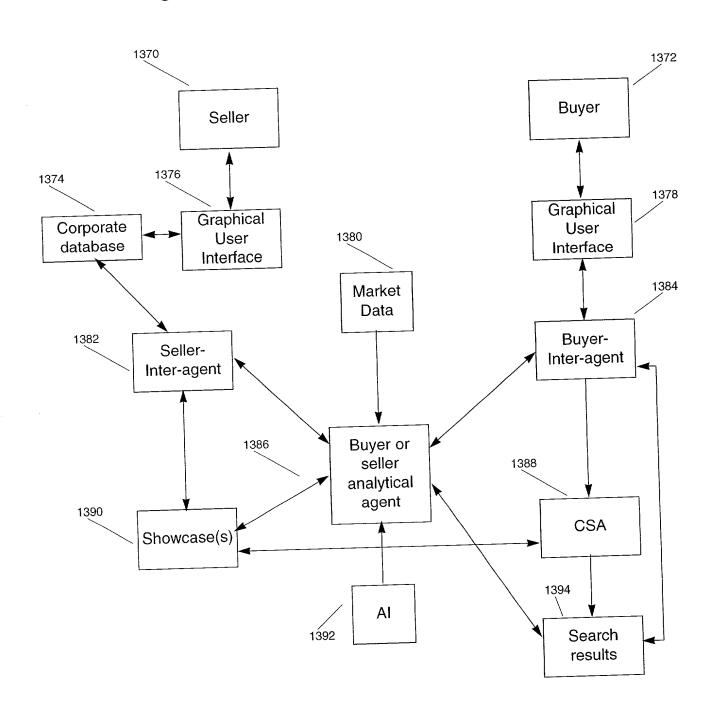


Fig. 9: Rivers of Data Flows

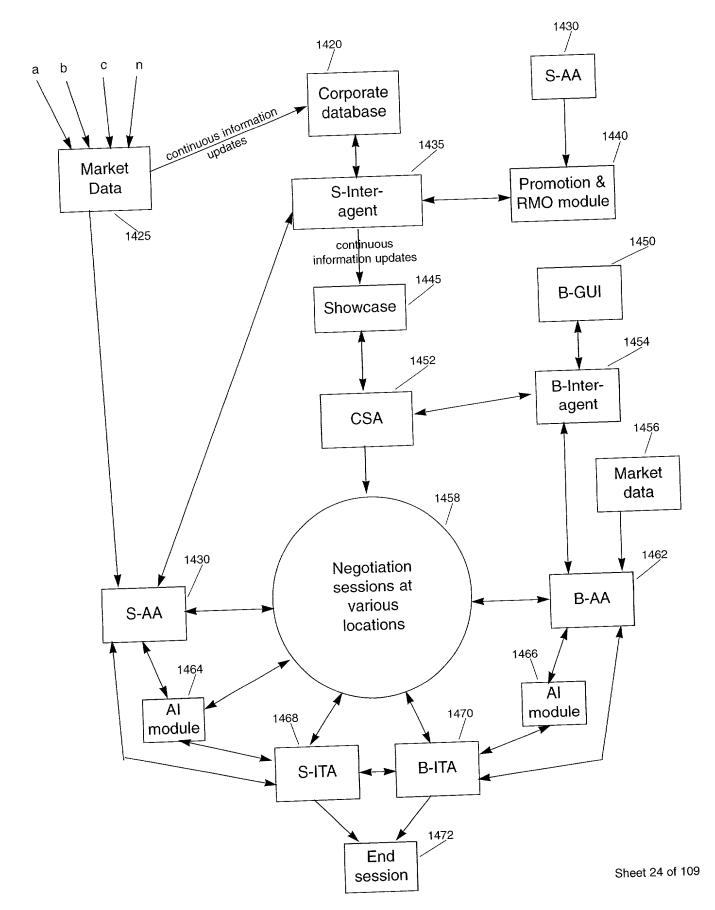


Fig. 10: CSA System Architecture 1500 Showcase 1550 database A 1530 1505 Promotions/ RMO's Showcase database B 1535 1510 CSA Showcase Continuous looped queries database C 1540 1515 B-AA Showcase database D 1545 1520 Market data Showcase database E 1525 Showcase database F

1585 1583 1552 Market Data Promo's Showcase S-2a & RMO's db1 IA (1) 1560 1620 1590 2b Promo's Showcase S-**B-Analytical** & RMO's Agent db2 IA 1565 3b 1595 За 2c Promo's 4b Showcase 1625 & RMO's db3 IA 4c **CSA** 4d 1570 4e 1600 1630 S-Promo's Showcase 6 & RMO's db4 IA **B-Inter** agents 5a 1575 2e 1605 7 1635 Promo's S-Showcase & RMO's db5 IA Negotiation sessions 5b 1580 2f 1610 Promo's Showcase S-& RMO's db6 IA 5c Sheet 26 of 109

Fig. 11: CSA First Query Sequence

Fig. 12: Programmability of CSAs for Priorities of Search

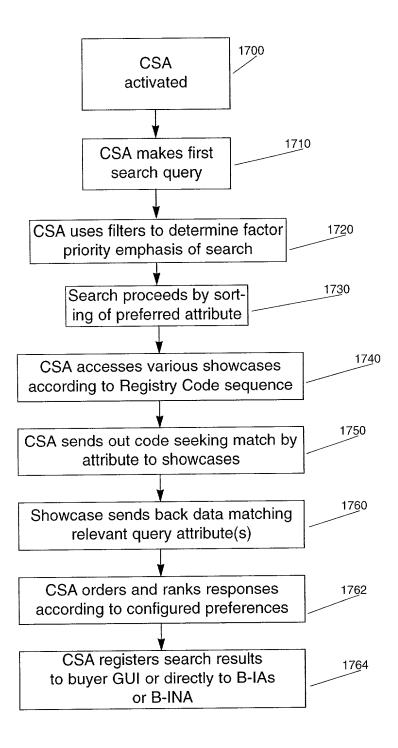


Fig. 13: CSA As Initial Search Query

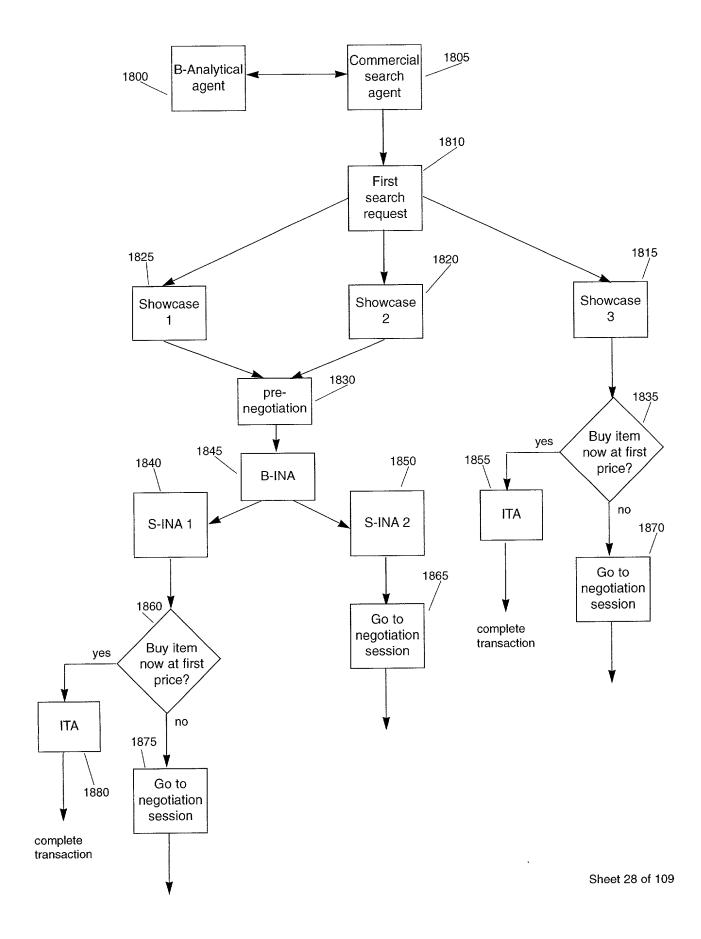


Fig. 14: CSA Filters

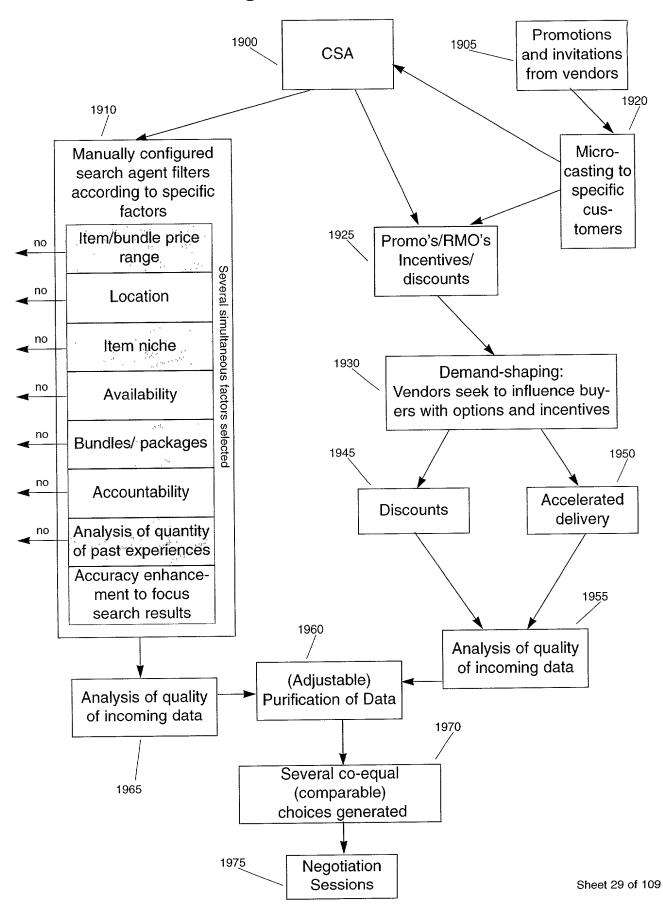


Fig. 15: Promotions

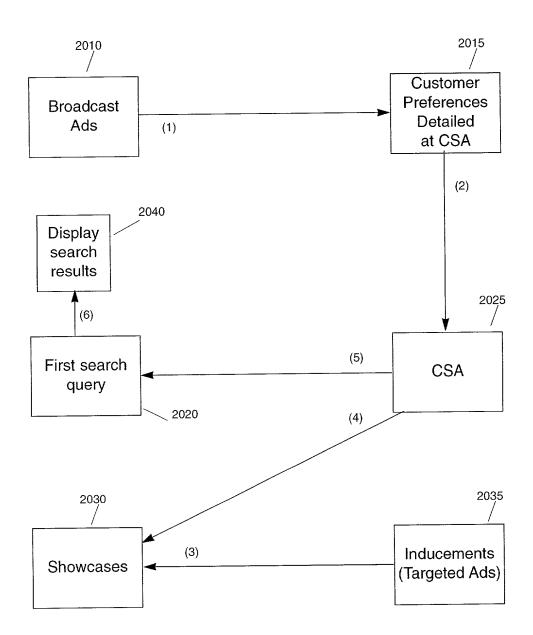


Fig. 16: Proximity Marketing For Mobile INAs

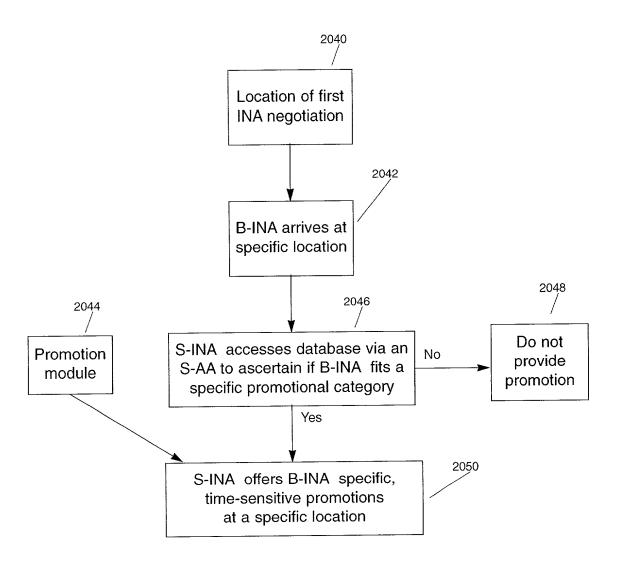


Fig. 17: Promotional Discounting

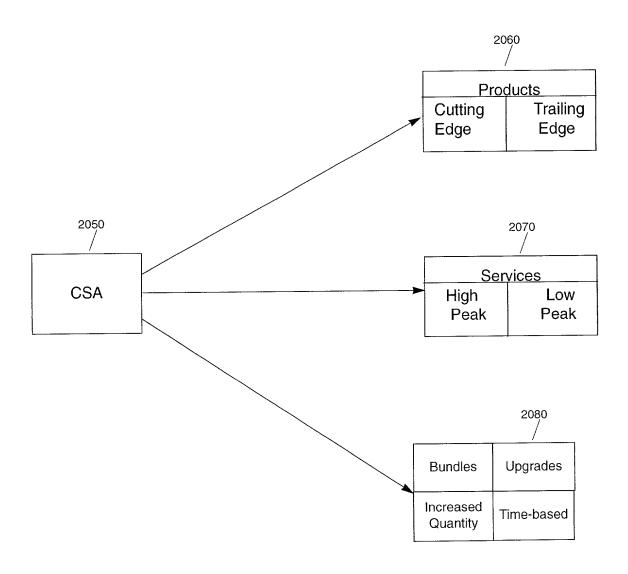
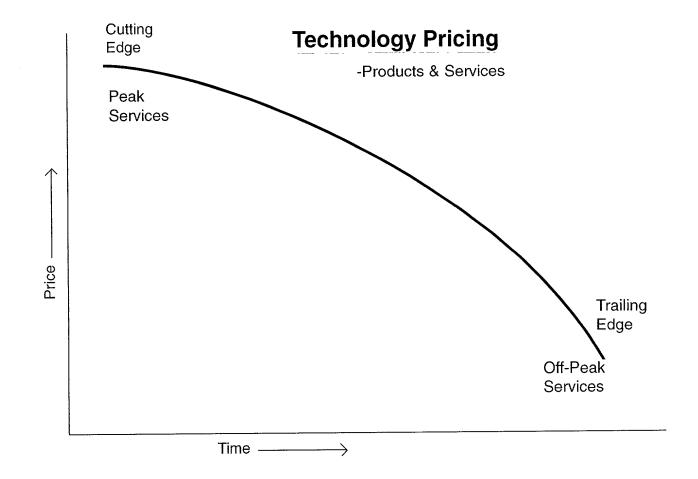


Fig. 18: Dynamic Pricing Model

#### **Conditions:**

- Product cycle rate
- Market/Economy
- Competition



### Fig. 19: Pricing Discount Promotions

#### **Dropping Prices Tendency**

- 1. Trailing edge technology
- 2. Off-peak service
- 3. Bundled packages (aggregation-discounts)
- 4. Surplus items
- 5. Decreasing quality
- 6. Quantity discount (multiple identical items)
- 8. Un-time-sensitive
- 9. Decreased features
- 10. Exploding (Time-sensitive) offers

Fig. 20: Promotions Integrated with CSA & Showcase

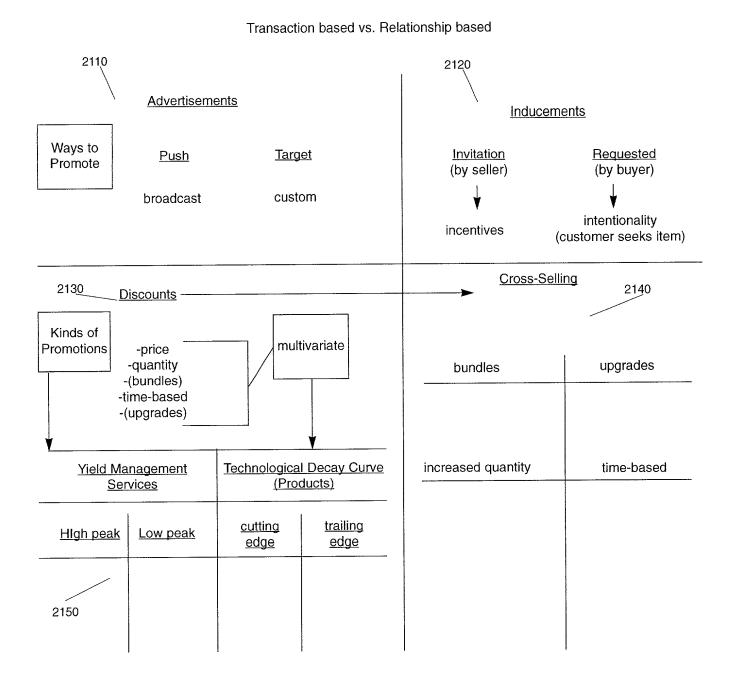


Fig. 21: RMO Contract Processes in Distributed System

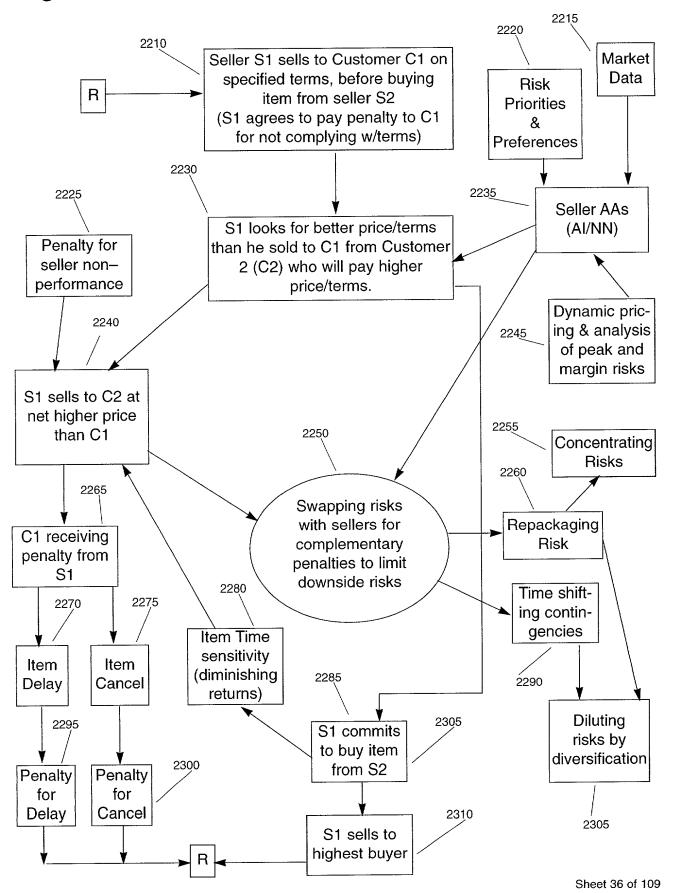
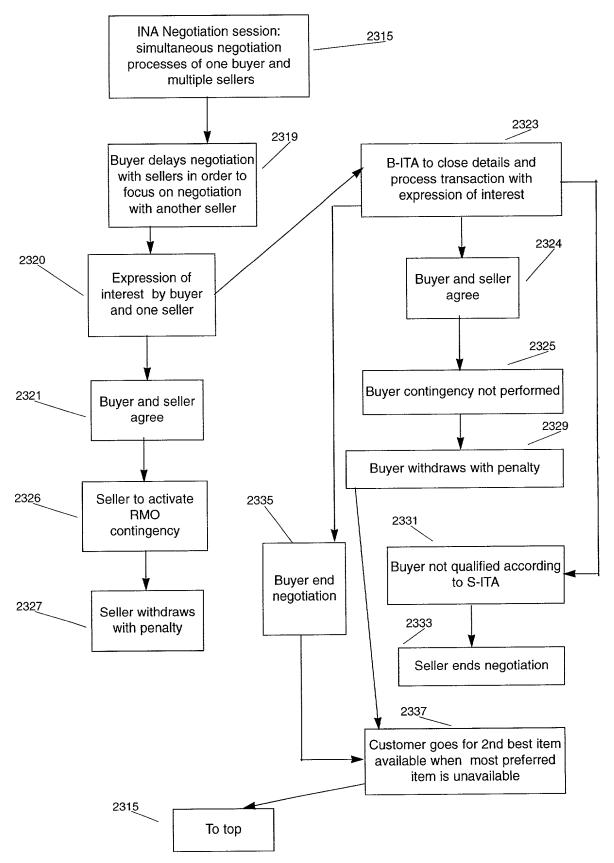


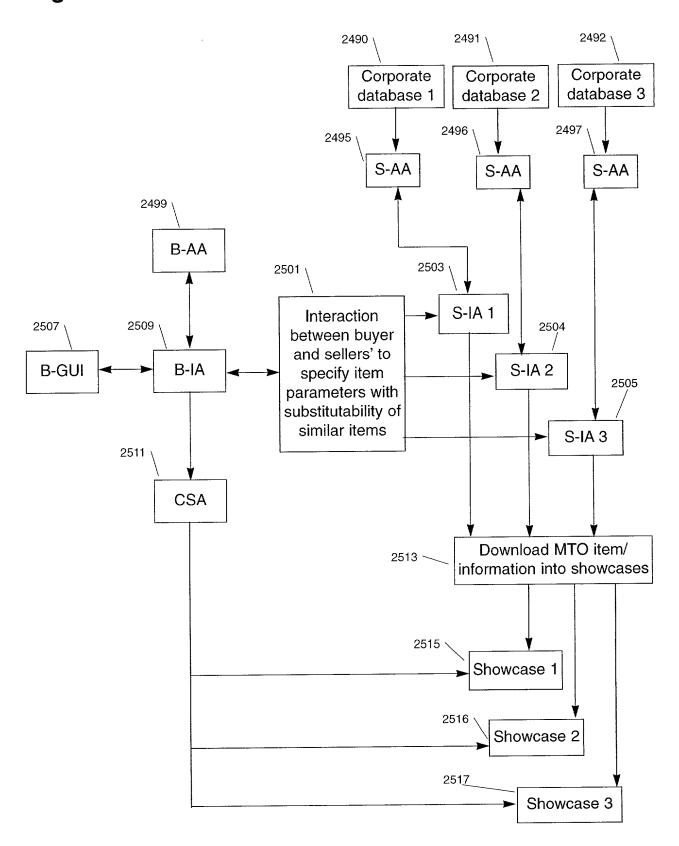
Fig. 22: Transaction Contingencies



2375 2370 2355 R 2365 R 2360 S-IA-1 S-AA s1-collaboration Pre-search B-IA B-AA b-collaboration 2380 2385 Use of prior forecasts S-IA-2 S-AA before initial s2-collaboration 2400 search 2410 2390 **CSA** Showcase 1 2415 during CSA 2433 S-IA-1 S-AA s1-collaboration 2420 B-IA 2430 2435 b-collaboration S-IA-2 S-AA B-AA s2-collaboration 2445 2450 Showcase 2 2445 2455 after CSA B-IA Pre-Negotiation b-collaboration 2465 2460 S-IA-2 2470 S-IA-1 s2-collaboration s1-collaboration 2475 Negotiation 2480 S-AA session(s) latest update B-AA 2482 is preserved 2484 2486 Close transaction Post-sale inter-b-INA collaboration: broadcasting & microcasting good deals to friends S-AA 2355 Sheet 38 of 109 2488

Fig. 23: Information Collaboration for MTO

Fig. 24: Collaboration Process For MTO Customization



Buyer Seller 2518 2521 2519 Corporate **GUI GUI** Database 2525 2523 S-Inter-agent B-Inter-agent 2545 2530 2555 2550 2535 2540 **B-Analytical** Market S-Analytical Show-Market **CSA** agent data agent cases data 2570 257,5 2560 Initial Search 2565 request Seller Seller 2577 **Buyer INA** INA2 INA<sub>1</sub> Search results 2580 Pre-negotiation session [Agreement on negotiation rules] 2585 First search response 2590 Negotiation sessions between B-INA & S-INA 2, and S-INA 1 & B-INA 2595 Selection of winner by buyer 2610 2605 2600 Cease negotiations and S-ITA B-ITA end session Sheet 40 of 109

Fig. 25: INA Interaction (B-INA & S-INA Interactions)

Fig. 26: INA Interactions - Ricochet Model

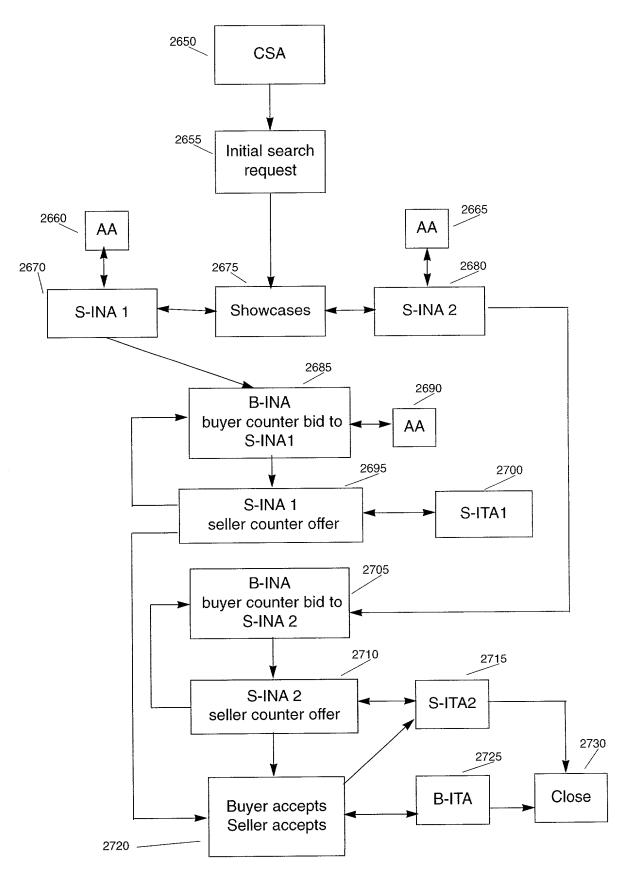


Fig. 27: Pre-Negotiation

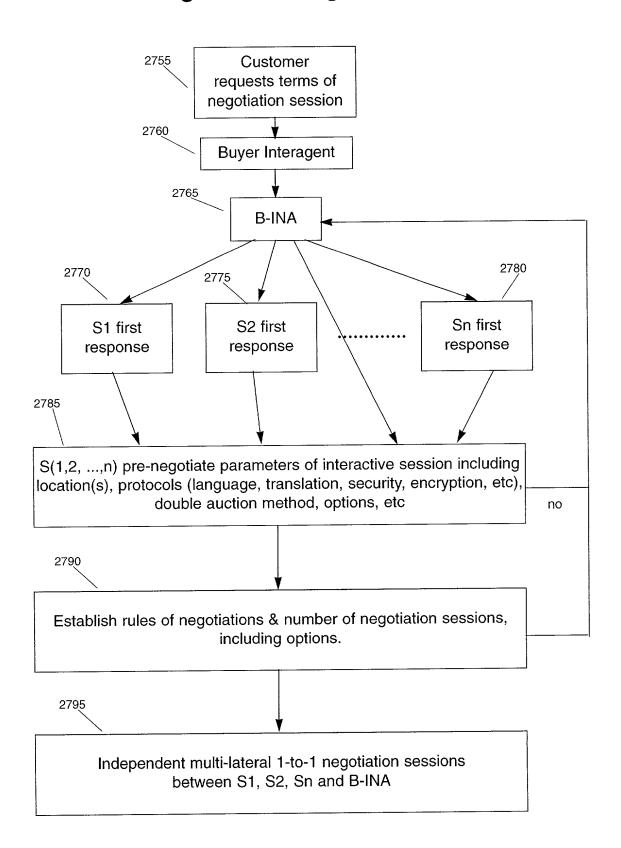


Fig. 28: Time-Based Negotiation Strategy Concealment

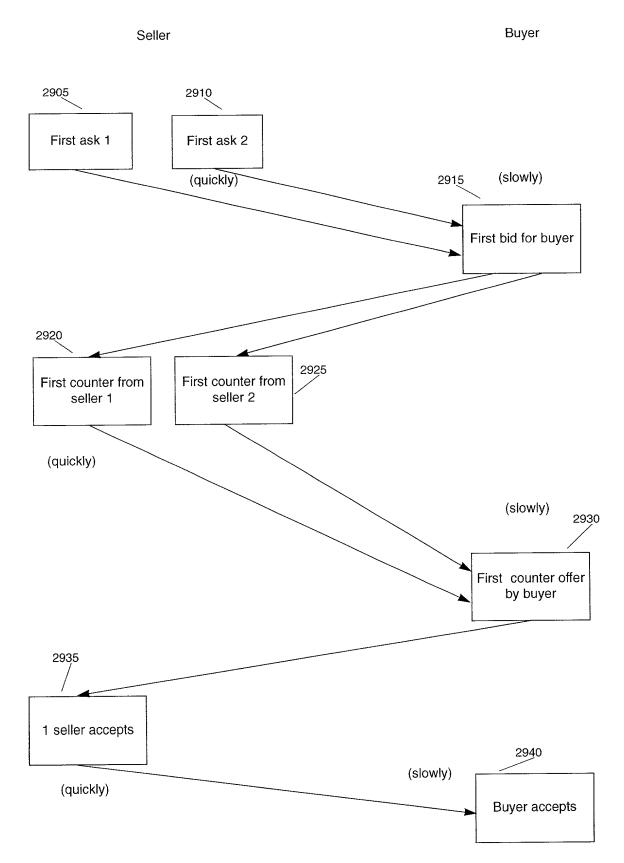


Fig. 29: INA Logistics

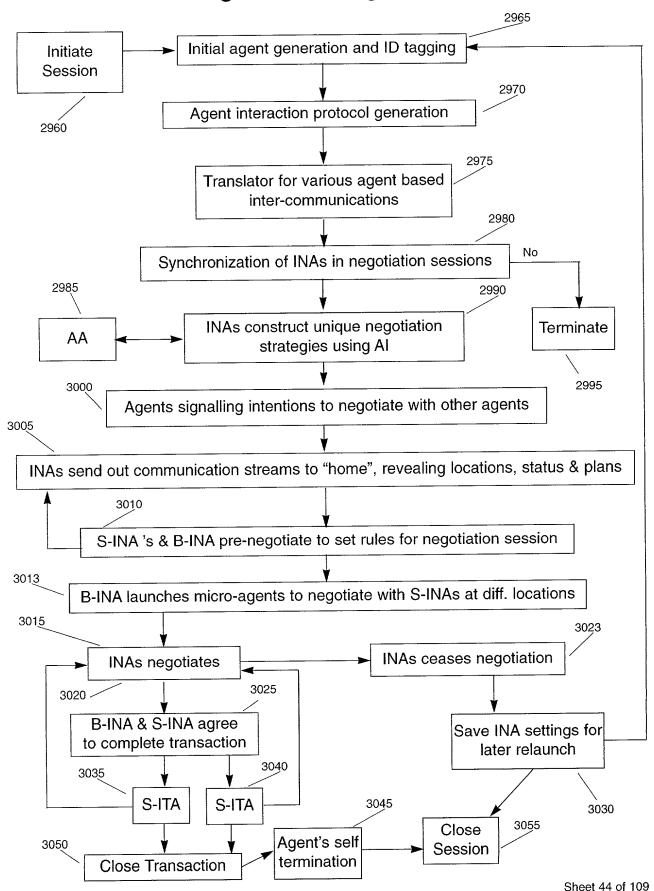


Fig. 30: INA Interaction Sequence #1

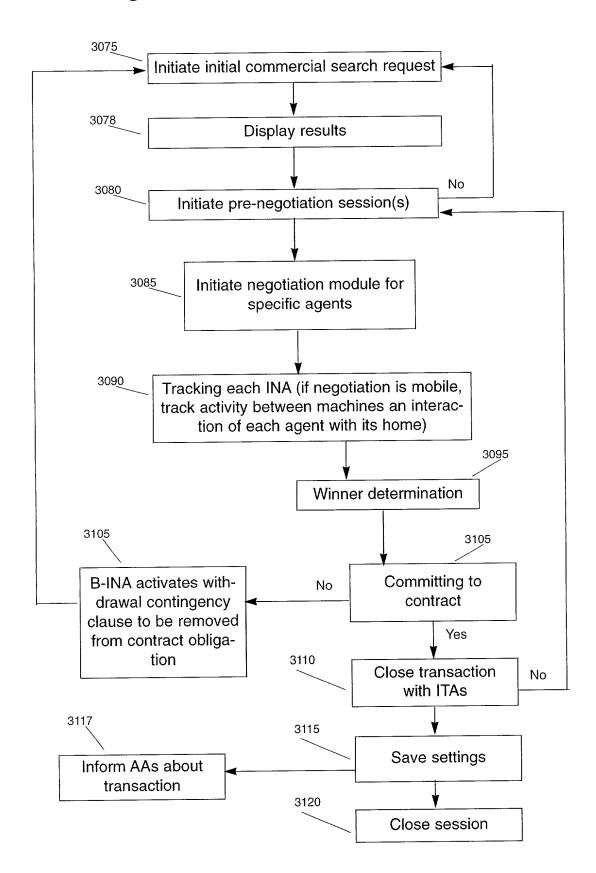
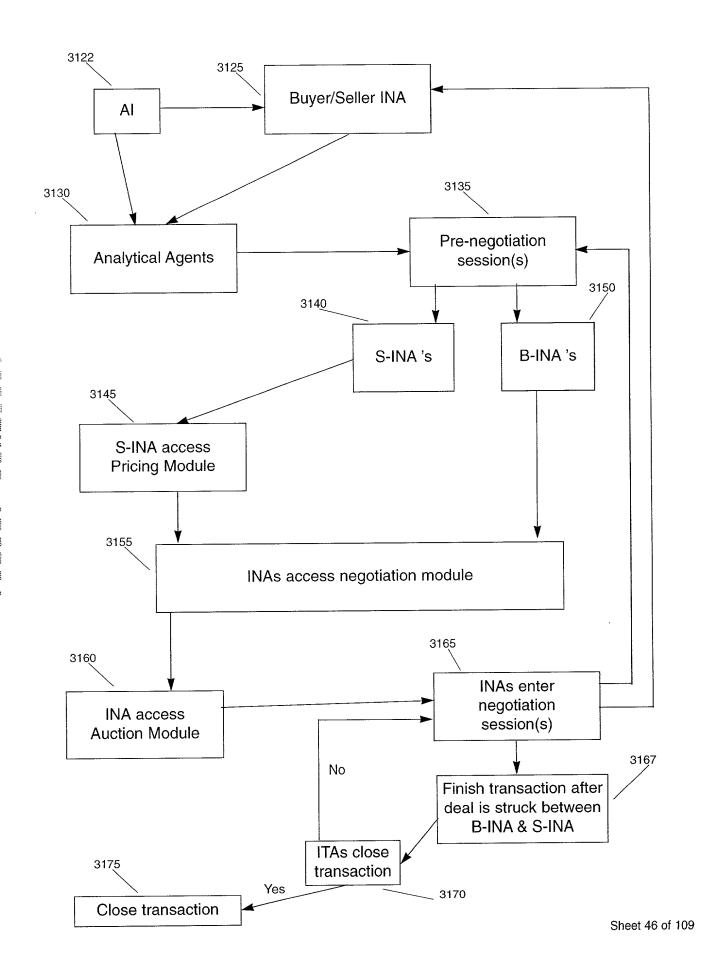


Fig. 31: INA Interaction Sequence #2



3215 3205 3210 Corporate Corporate Corporate database database database 3230 3225 3220 3235 3240 Seller Seller Seller Inter-Agent3 S-AA Inter-Agent1 S-AA Inter-Agent2 3255 3245 3250 Showcase 3 Showcase 2 Showcase 1 3265 **Promotions Promotions Promotions** RMO's RMO's RMO's 3270 3275 3260 CSA 3280 Initial search request 3282 Display results 3285 3290 **Buyer INA** B-AA 3305 3295 3300 Pre-negotiation Seller INA-3 Seller INA-1 session 3315 3320 3325 3310 Select win-Negotiation Complete Disable ner & award Agent session transaction contract Sheet 47 of 109

Fig. 32: INA Architecture 1 (First part interactions)

3470

Close session

B-AA 3423 3410 S-AA S-AA Seller Buyer Seller Seller INA2 INA INA3 INA<sub>1</sub> 3415 3430 3425 3420 3405 3435 Pre-negotiation session 3440 All INAs Negotiation session 1 with several INAs 3443 B-INA & SINA1 & B-INA & SINA3 session 2 3445 B-INA & S-INA3 Negotiation session 3 Re-negotiate Select winner & award contract 3450 -3460 3455 **B-ITA** S-ITA

Complete

**Transaction** 

3465

Fig. 33: INA Architecture 2 (Negotiation interactions)

Fig. 34: INANegotiation Time Based Sequences

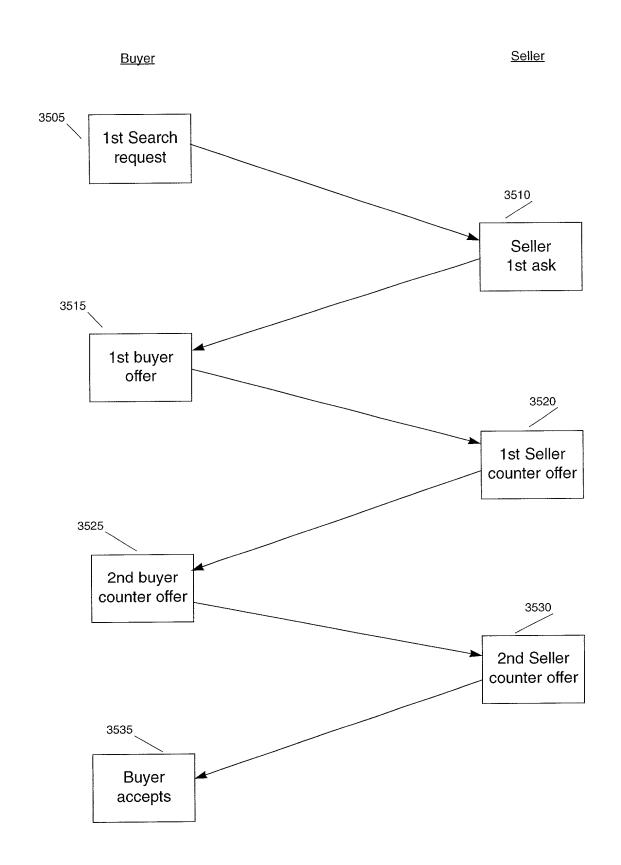


Fig. 35: Initial INA Mobile Location Protocol Settlement

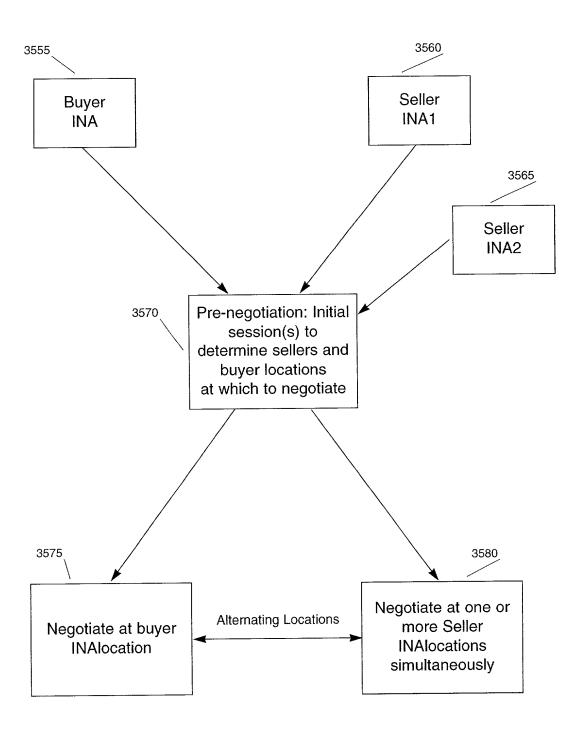
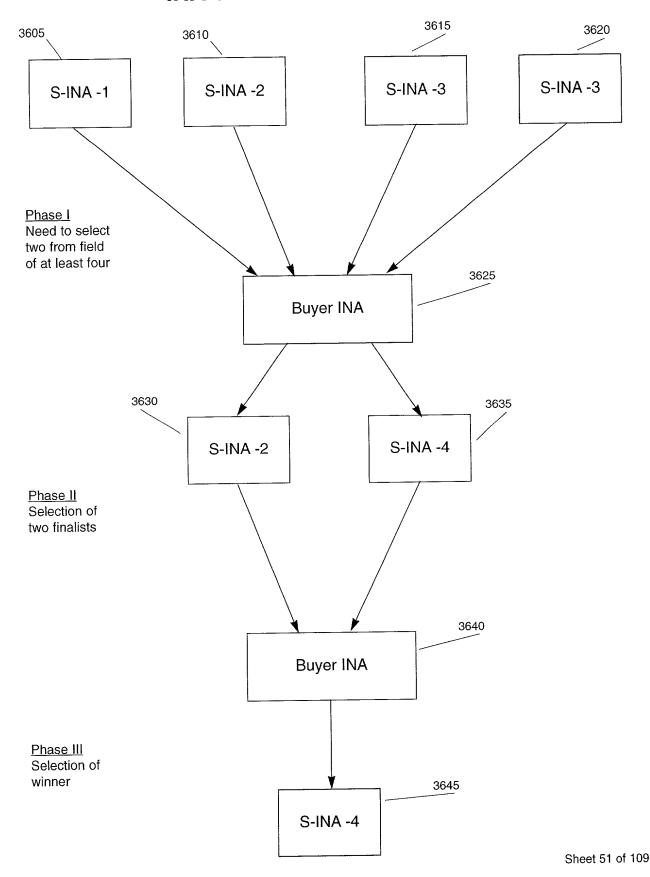


Fig. 36: Tournament Configuration of INA Winner Determination



3705 1st CSA [Asks, bids and offers search based on variables beyond price alone] request 3715 3710 1st ask by 1st ask by Seller INA-2 Seller INA-1 3725 3720 Seller AA Seller AA 3730 checks buyer's Buyer INA1st counterchecks buyer's credit & bid\* sales history accountability to each S-INA 3740 S-INA -2 1st S-INA -1 1st 3735 counter offer counter offer 3750 Need more negotiation to complete transaction Buyer INA2nd 3745 Buyer INA2nd counter-bid to counter-bid to SINA-2 SINA-1 3754 3756 3752 S-INA -2 2nd no S-INA -1 2nd no counter offer **Terminate** counter offer 3762 yes Need more negotiation to complete transaction 3760 **Buyer INA B-ITA** accepts S-INA -2 \* Counter-bids and counter offers can be offer based on item, quality, features, terms & other 3764 To Complete Transaction factors beyond price. S-ITA2 3768 Close 3766 Terminate Transaction session Sheet 52 of 109

Fig. 37: Multivariate Negotiation

Fig. 38: Demand-Initiated Automated Negotiation Sequence Compromise Process Within Pre-established Parameters between One Buyer & One Seller

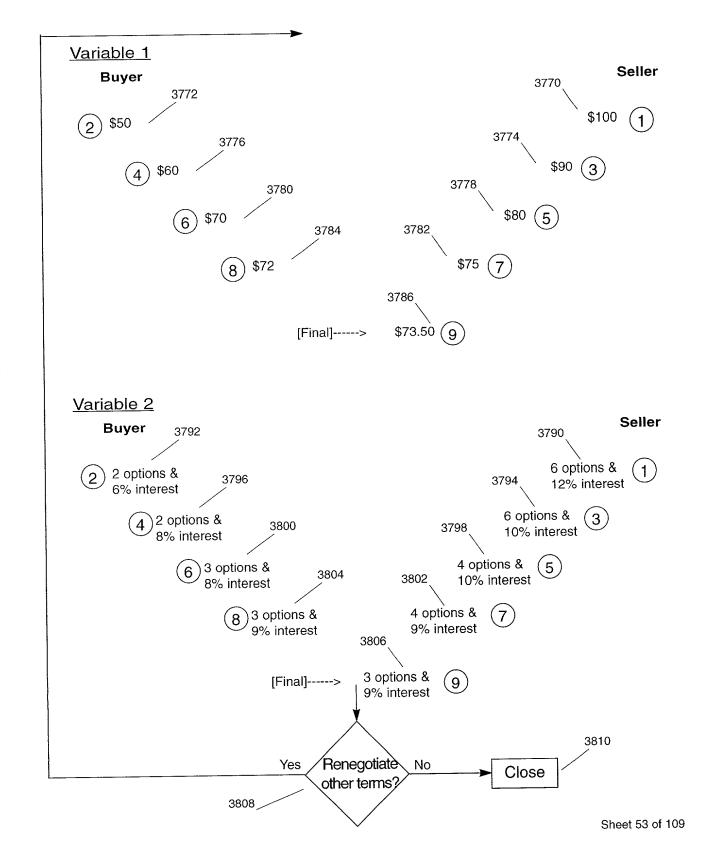


Fig. 39A: Negotiation in a Distributed System with Mobility

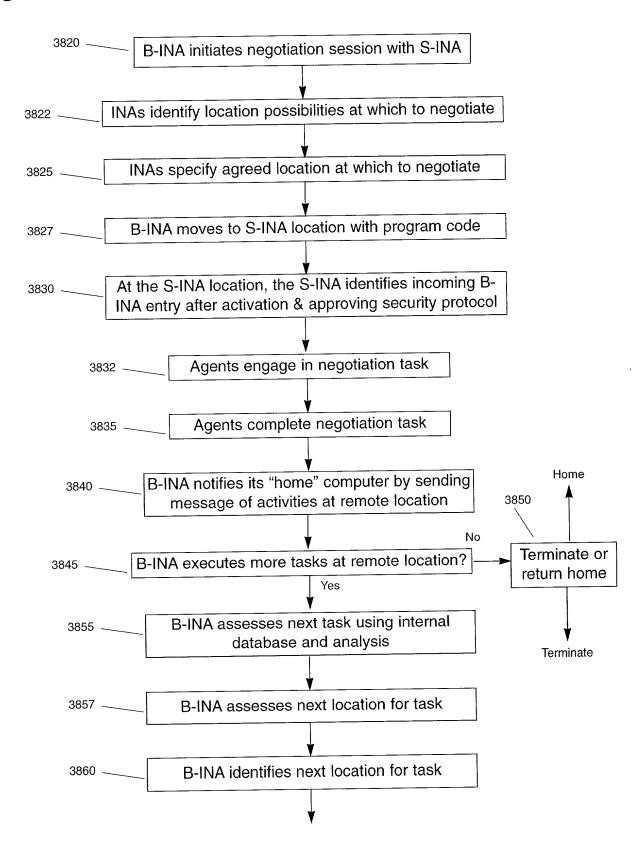


Fig. 39B: Negotiation in a Distributed System with Mobility (Continued)

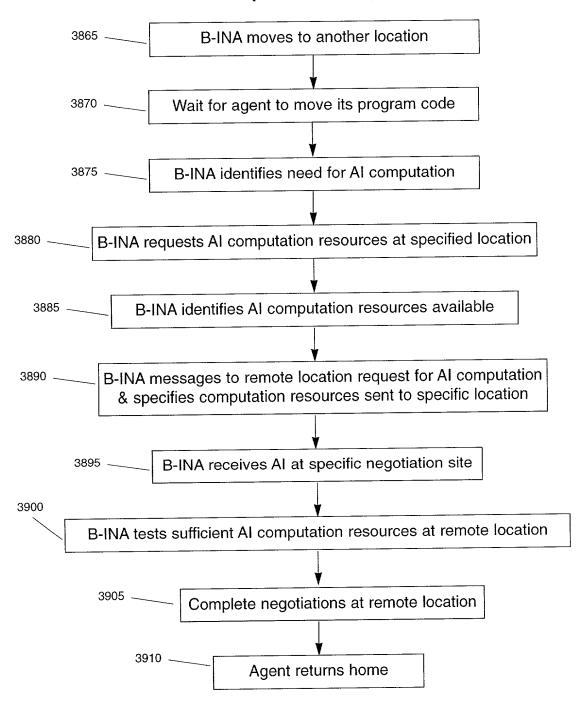
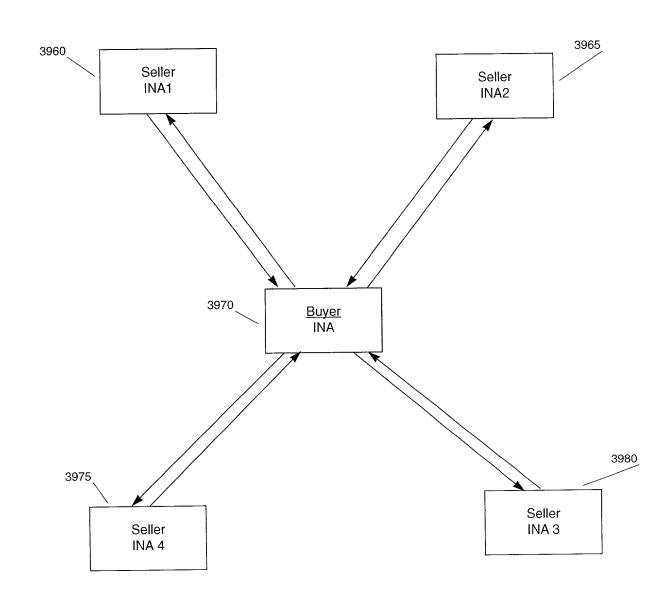


Fig. 40: Multi-lateral Distributed Competition (Competitive Double Shout Negotiation)



### Fig. 41: Negotiation Module: Negotiation Method Schema

#### 1 to 1 Interactive Negotiations

#### Kinds Of Goals

Short Term goal (price - maximization)

-VS-

Long-term goal (relationship management)

## Constraining Factors

- 1) Time constrained: multi-sessions as instrumental changes
- Information
   constrained: less
  than optimum information
- 3) Choice Constrained: Limiting of options

#### **Terms**

1) Item terms
 2) Transaction terms

## Cooperative Goals (Zero-Sum Game)

- 1) Exchange-based approach: Trade-off of terms/variables between parties
- a) matching of interests: ascertain mutual interest with overlapping sets...
- b) prioirtizations of preferences: hierarchy of similar priorities
- 2) Problem-solving approach:parties seek a common solutiona) assessing common interestsamong different positionsb) compromise of positions to acommon set shared by parties

#### **Buyer-Initiated**

[Negotiation as adjustment of seller parameters]

- a) buyer query as initiation
- b) priority of best and then second best, and then third best, etc...

## Competitive Goals (Zero-Sum Game)

- 1) dialectical approach: give & take of opponents until resolution a) [position description & justification] explanation based: each position advances and develops b) [Interrogation] argumentation: critique of opponent's position\* c) [Ascertain mutual self-interest] Assessing overlapping interests d) Selecting common sets
- \*Anticipate opponent's strategy

#### Non-Zero-Sum Game

1) deterrence approach: behaving so that competitors do not get without higher cost a) bidding aggressively and/or deceptively and then withdrawing

#### Seller initiated

[Negotiation as disagreement with initial seller promotions] a) promotions or 1st seller bid (result of search query) as 1st point of departure

#### Multiple Parallel Interactive Negotiations

One to several

a) Stopping negotiation when
one winner is selected

Several to several
Single Item: Stopping negotiation when one buyer & 1 seller is selected
Multiple items: a) Stopping negotiation when mutual agreement of multiple parties

### Fig. 42: INA Auction Module-Auction Types

Auction Types			
English (Increasing)	Dutch (Decreasing)		
Vickrey (second highest bid)	"combinatorial" multiple-item auctions (package deals)		
Combinations of auction types	Double-shout		

Fig. 43: Negotiation, Pricing & Auction Module Interactions

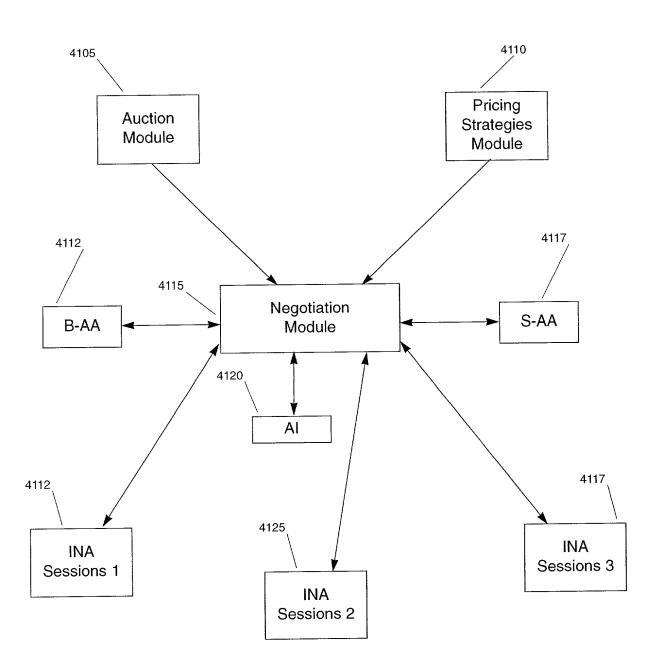
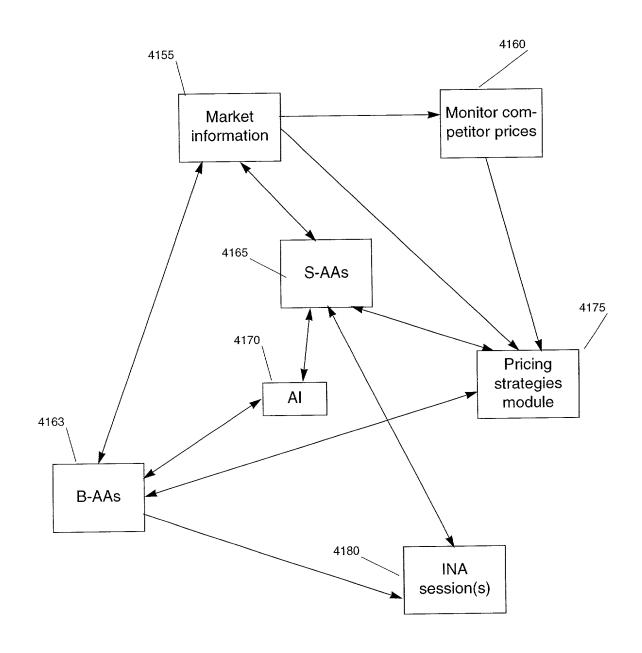


Fig. 44: Pricing Strategies Module and AA Interactions



## Fig. 45: Interaction Dynamics of INA"Personalities"

Yield Management	-Seller surpluses -Buyer shortages		-Seller shortages -Buyer surpluses
INA Stance	Optimistic		Pessimistic
INA Stance	Opportunistic (exploit)	neutral	Conservative (wait)
INA Stance	Aggressive (rush)	neutral	Unaggressive (delay)
Combination of INA Stance	Alternating between various "Attitudes" primarily to disguise INA Stance(s)		

## Fig. 46: Neutral Broker Agency C-INA Intermediation & Aggregation Applications

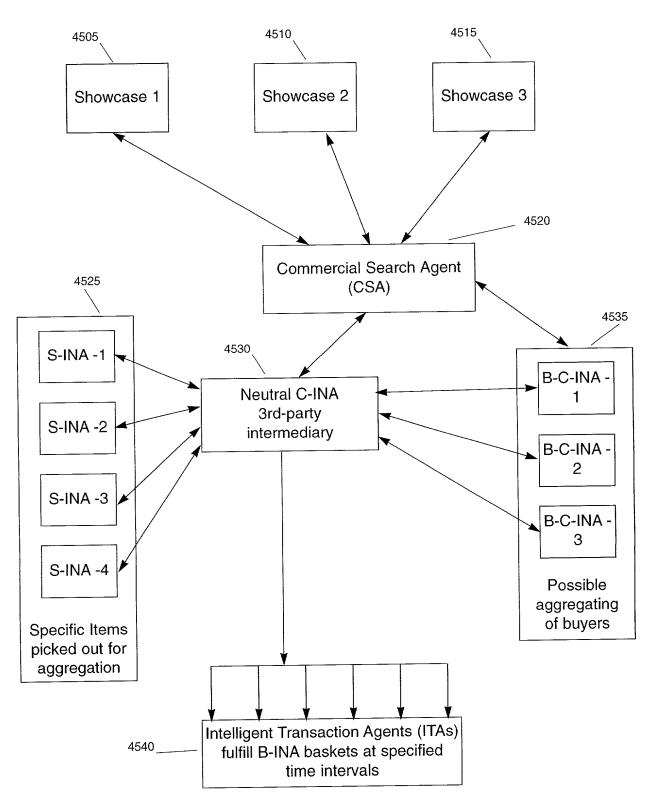
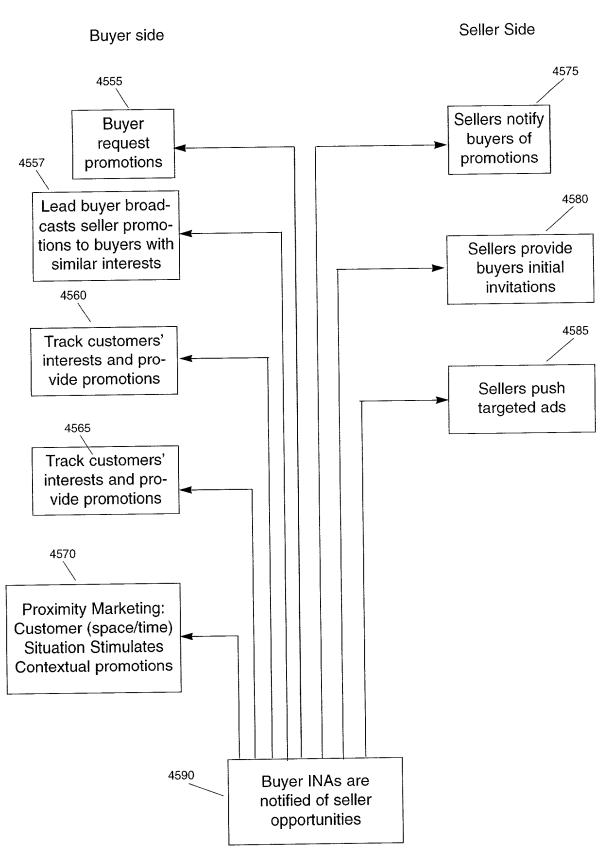


Fig. 47: C-INA Transaction Initiation Sources



4615 4610 4605 Showcase 3 Showcase 2 Showcase 1 4620 **Promotions** 4625 Commercial Search Agent (CSA) 4630 (search requests) b-ITAs 4640 Lead 4635 b-c-INA 1 b-c-INA 2 b-c-INA 3 b-c-INA Co-ordinates others Seller triggers buyer co-operation by initiating negotiation process with several buyers 4655 4650 s-INA 2 s-INA 1 4665 4660 s-ITA 2 s-ITA 1 4670 Winner determinations and allocations of items 4675 Close transactions Sheet 64 of 109 End ◀

Fig. 48: B-C-INA Aggregation

Fig. 49: Automated Aggregation Category Structures

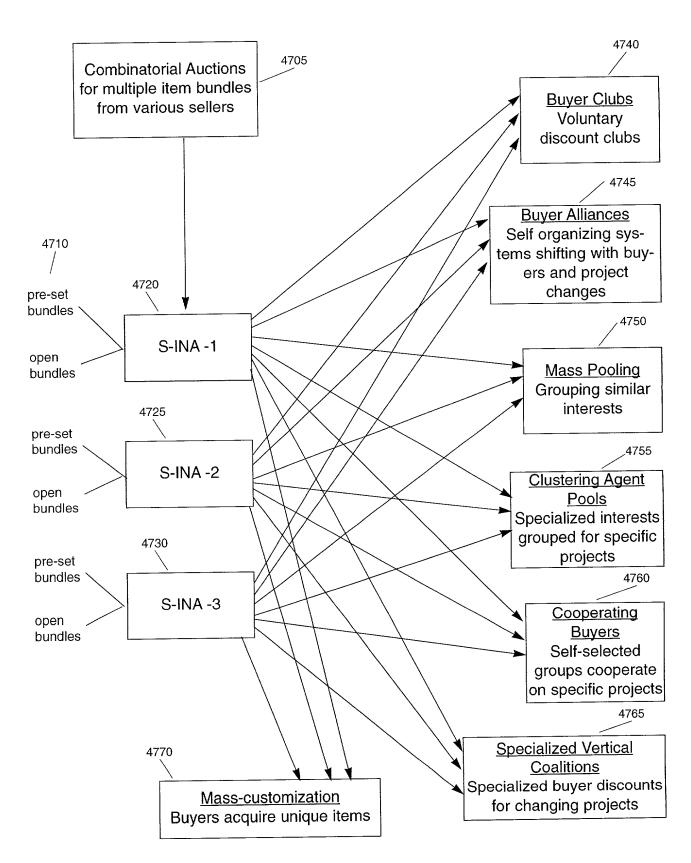


Fig. 50: Aggregation I – Mass Pooling

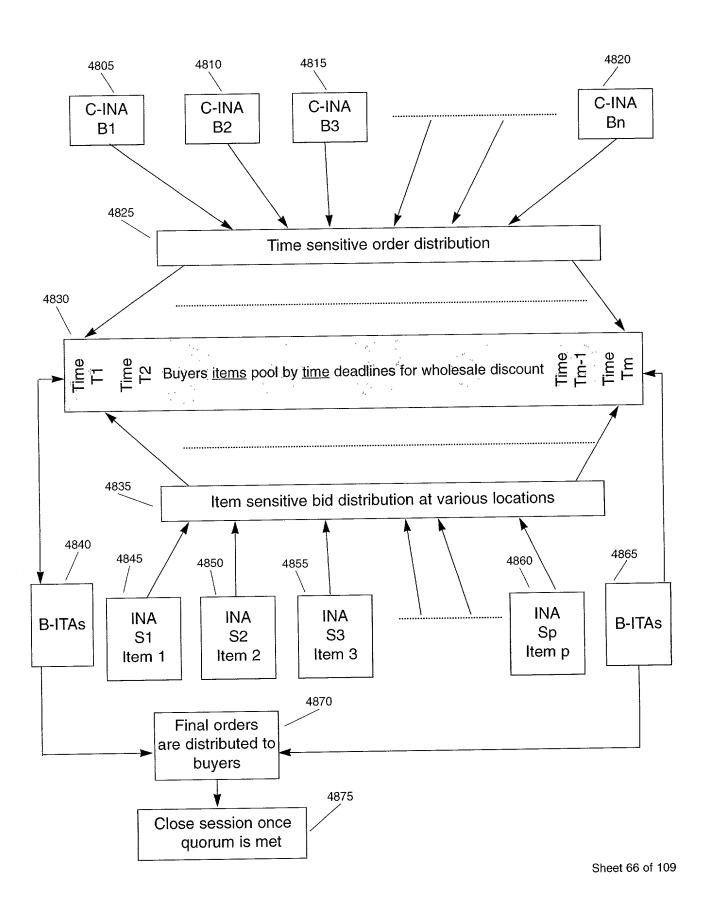
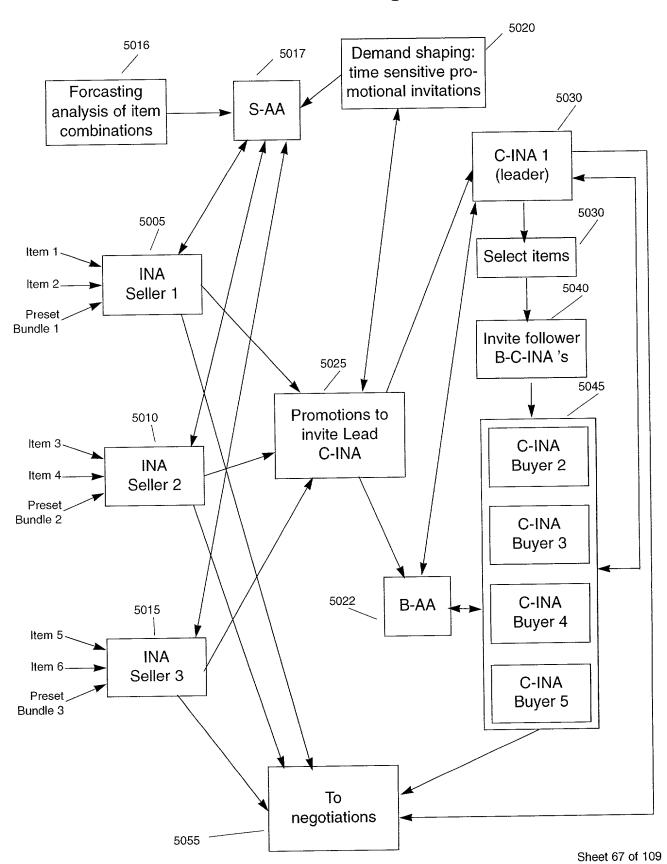


Fig. 51: Aggregation II-Disintermediated Aggregation Method Prior To Negotiation



## Fig. 52: Aggregation III – Disintermediated Mass Customization

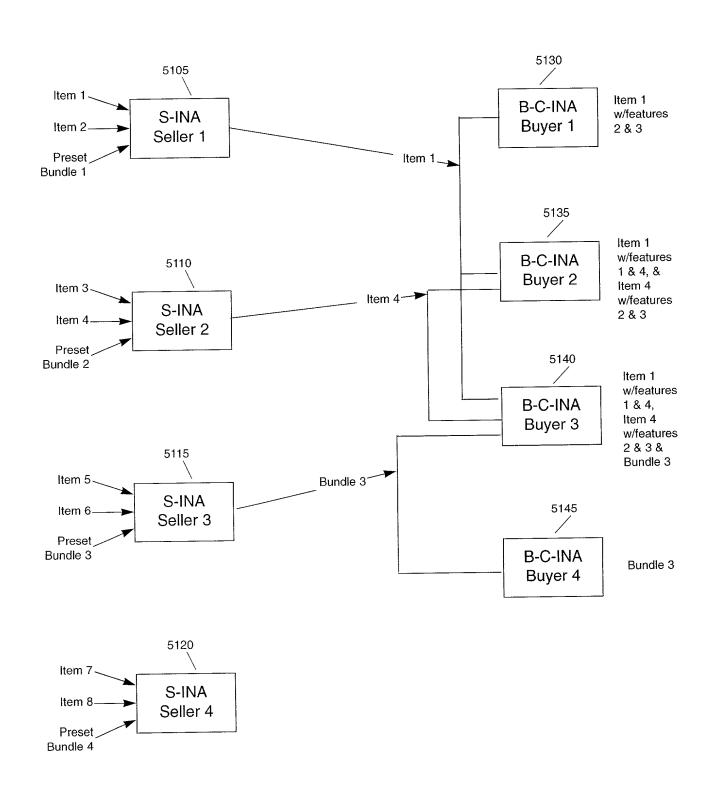
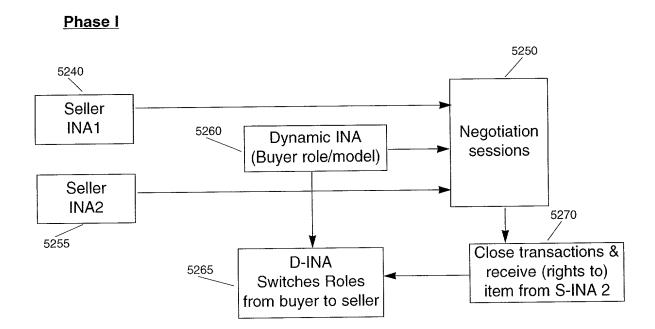


Fig. 53: Dynamic D-INA 's Double-agents:
Arbitrage Applications



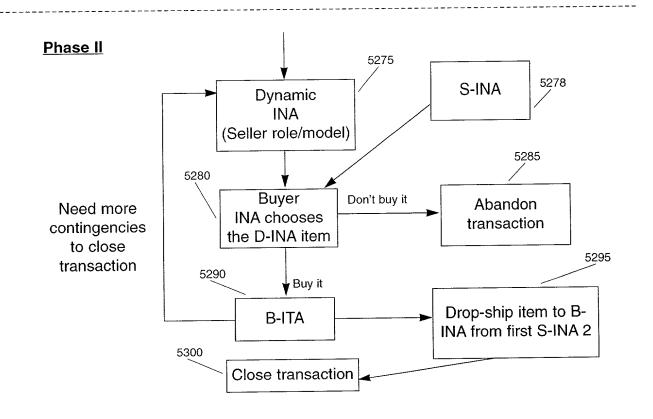
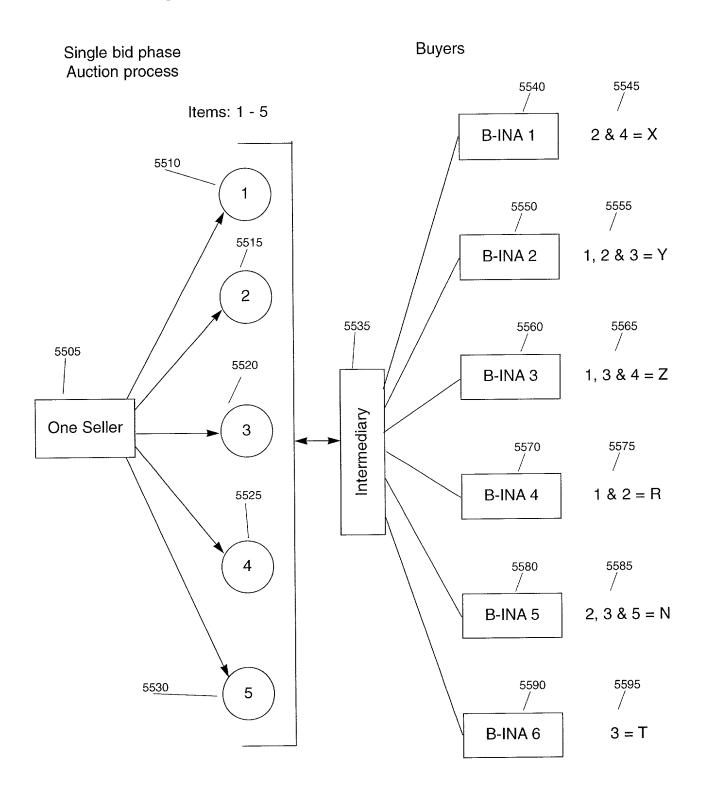
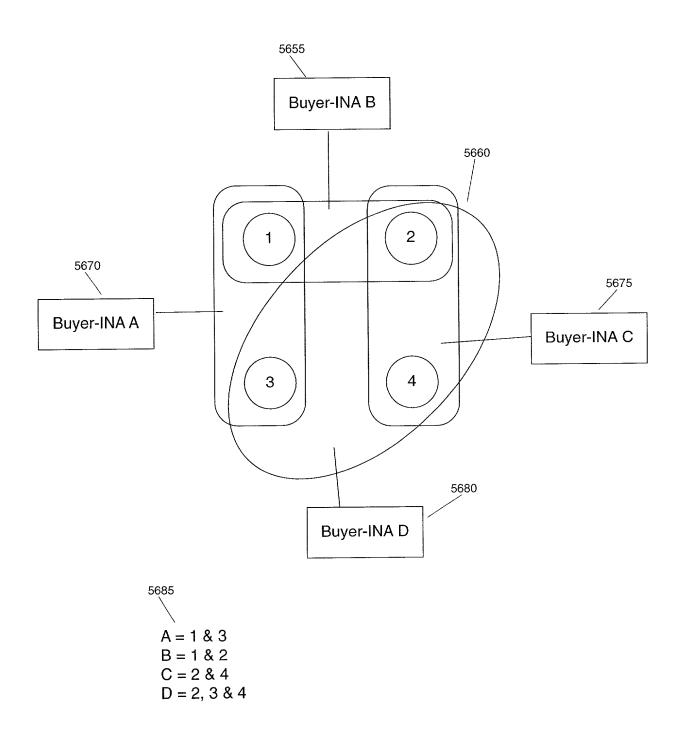


Fig. 54: Traditional Combinatorial Auction with Intermediary: Between Single Seller and Multiple Buyers



# Fig. 55: INA Combinatorial [Double] Auction between Single Seller with Multiple Items and Multiple Buyers



## Fig. 56: Final Session Winner Determination of Interactive Multi-lateral Auction

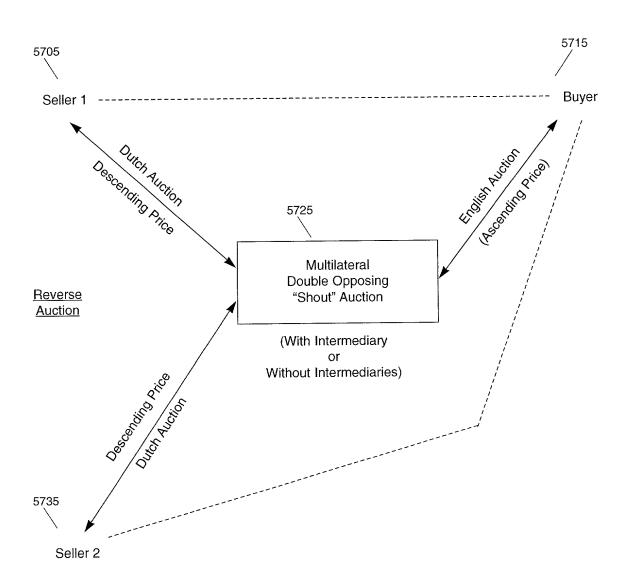


Fig. 57: Factor Filters

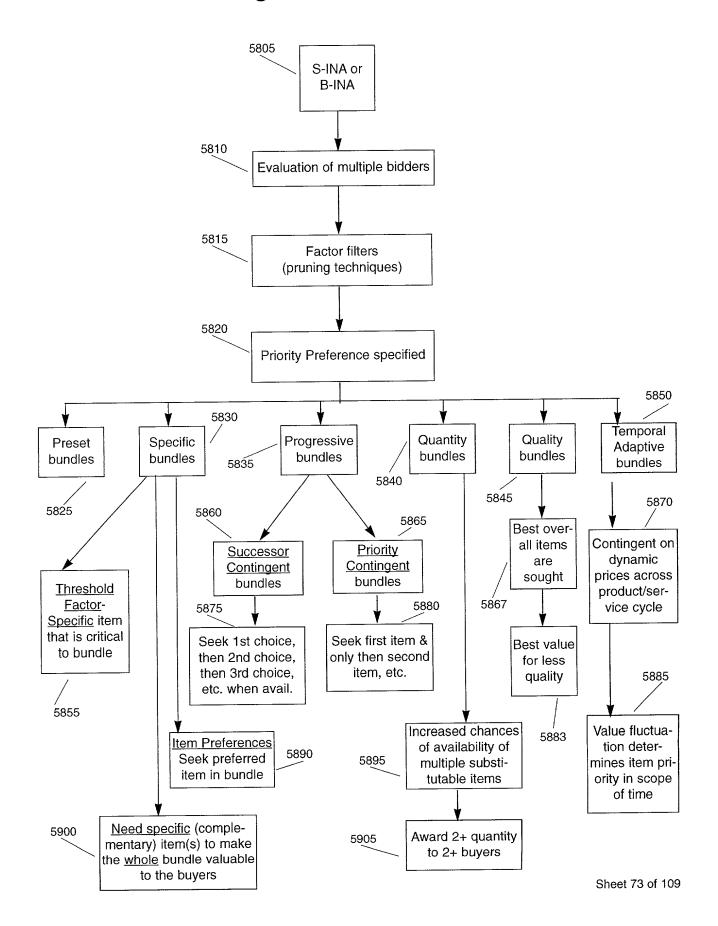


Fig. 58: Disintermediated Multi-item Bidding From One Seller To Multiple Buyers

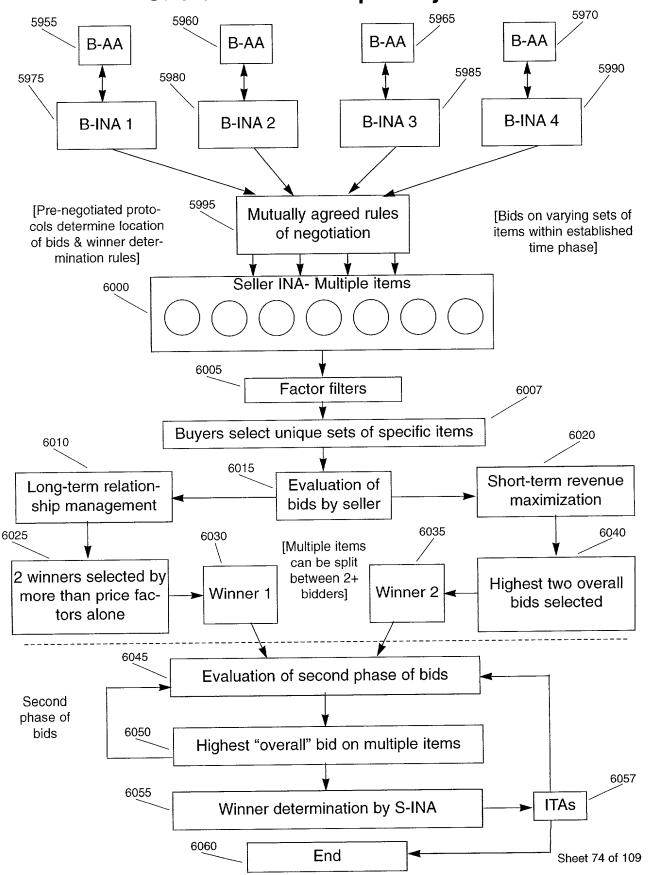


Fig. 59: Disintermediated Multi-item Bidding between Multiple Sellers and Single Buyer

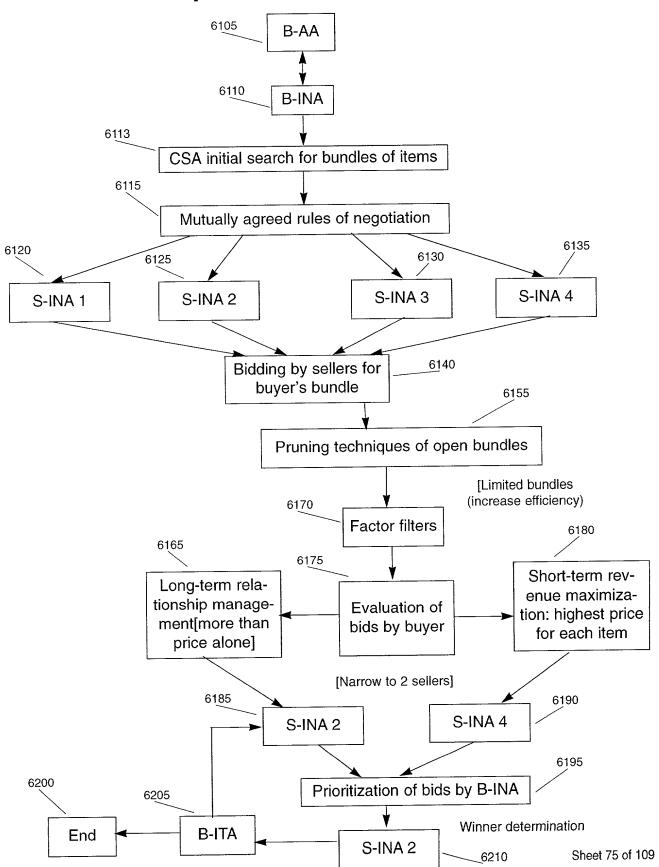


Fig. 60: Disintermediated Aggregation of Pre-Set Bundles between Multiple Sellers & Multiple Buyers

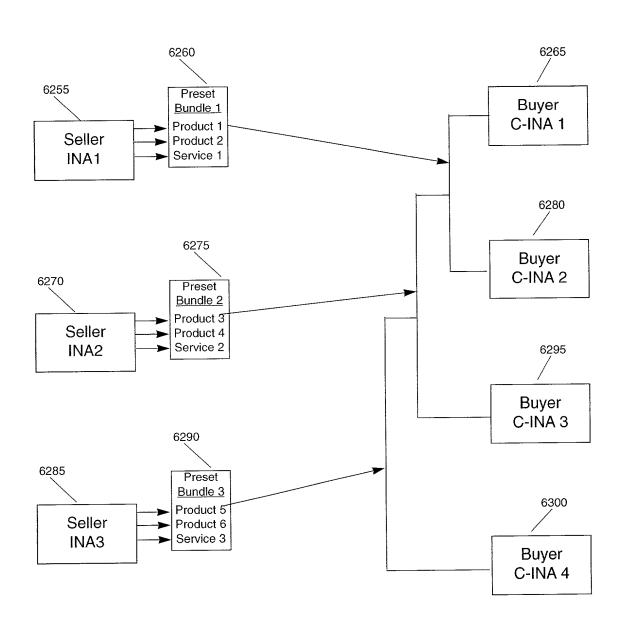
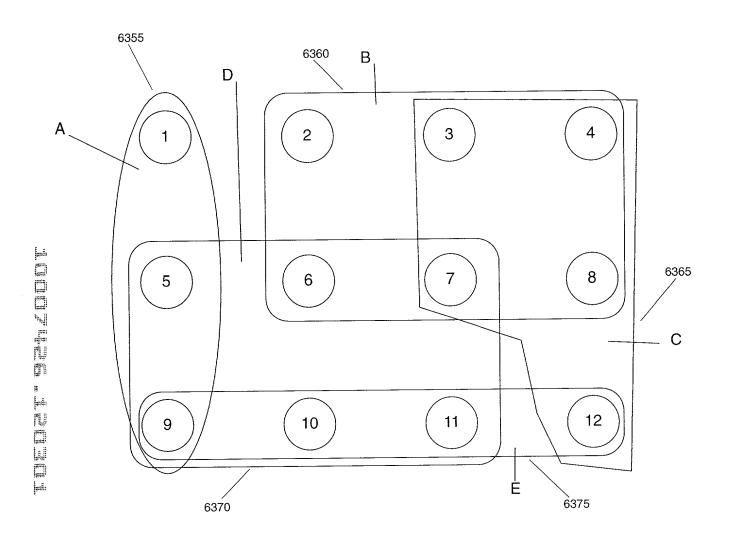


Fig. 61: Disintermediated Multi-item Bidding Between Multiple Sellers & Multiple Buyers



 1 - 4:
 Seller I
 Buyer Bidder A:
 1, 5, 9

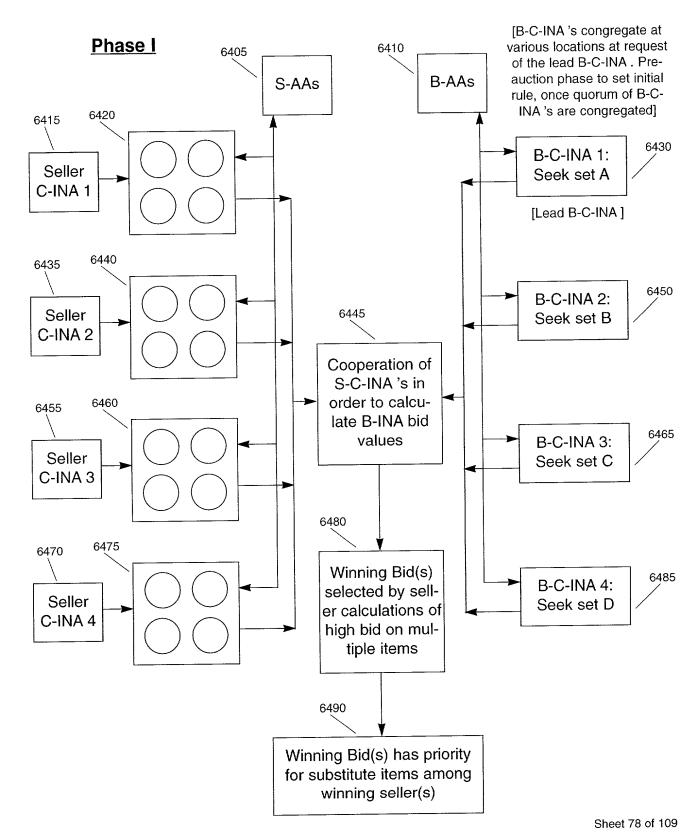
 5 - 8:
 Seller II
 Buyer Bidder B:
 2, 3, 4, 6, 7, 8

 9 - 12:
 Seller III
 Buyer Bidder C:
 3, 4, 7, 8, 12

 Buyer Bidder D:
 5, 6, 7, 9, 10, 11

Buyer Bidder E: 9, 10, 11, 12

Fig. 62A: Disintermediated Aggregation Of Multiple-item Bundles Bidding From Multiple Sellers To Multiple Buyers using C-INA's



# Fig. 62B: Disintermediated Aggregation Of Multiple-item Bundles Bidding From Multiple Sellers To Multiple Buyers using C-INA 's (continued)

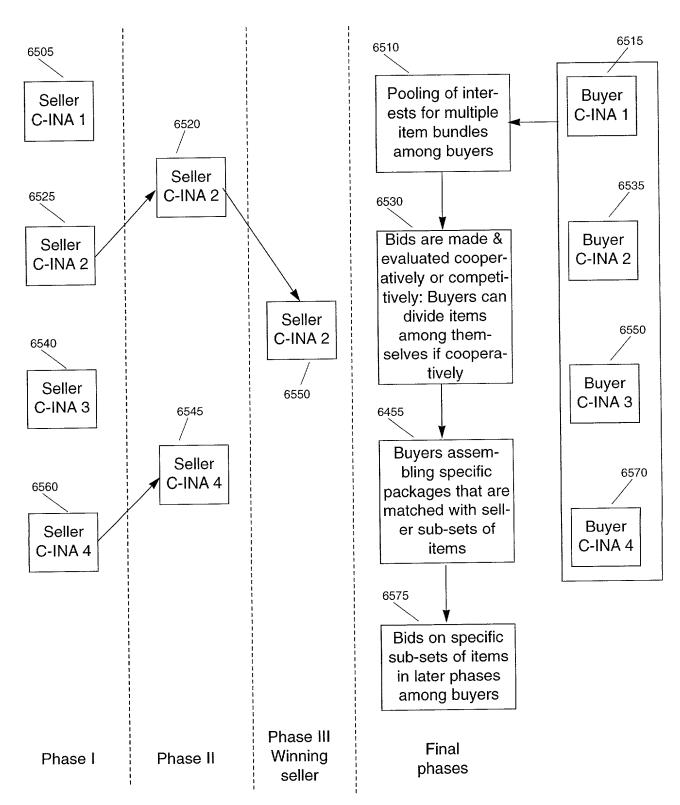
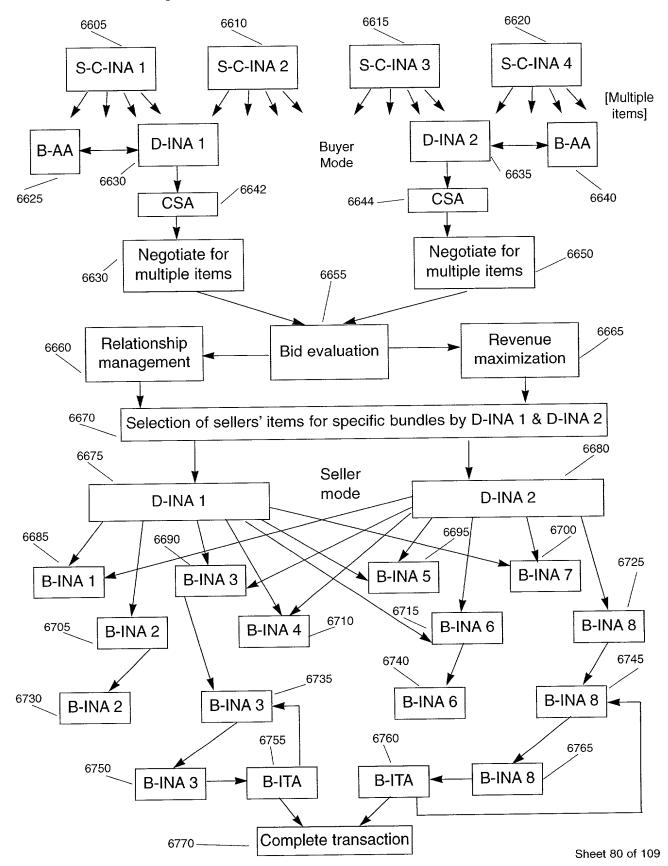


Fig. 63: Disintermediated Arbitrage Of Multi-item Bundles Between Multiple Sellers & Multiple Buyers using D-INA 's



## Fig. 64: Multifactorial Bidding Approaches Sorting By Item Variables

Quality
Attribute – color, style, etc.
Quantity
Availability (now or later)
Delivery Time & Terms
Size
Dynamic Pricing Across product/service cycle
Brand/manufacturer
Configuration
Features
Additional options
Combinations of various features
Price
Payment Method
Payment Terms
Location

Fig. 65: Example of Multiple Feature Factors: Personal Computer Configurations

	CPU/ Mother					Modem & ISP			
Manu.	board	Brand	os	RAM I	HDD	contract.	DVD	Monitor	Price
Intel	500-ABC	IBM	MS	64	10	56 kbs	DVD	15 in	
Intel	500-ABC	Dell	MS	128	10	56 kbs	DVD	17 in	
AMD	500-XYZ	Gateway	MS	128	20	56/ISP	DVD	19 in	
AMD	800-XYZ	HP	MS	128	0	56/ISP	DVD	17 in	
AMD	800-ABC	IBM	MS	256	20	56/ISP	DVD	17 in	
AMD	800-ABC	Dell	Linux	256	20	128	DVD-RAM	17 in	
Intel	800-ABC	Gateway	Linux	256	30	128	DVD-RAM	17 in	
Intel	800-ABC	HP	Linux	256	30	128	DVD-RAM	17 in	
Intel	1.2-XYZ	IMB	Linux	256	30	128/ISP	DVD-RAM	17 in	
Intel	1.2XYZ	Dell	Linux	256	40	128/ISP	DVD-RAM	17 in	
Intel	1.2-ABC	Gateway	MS	256	40	128/ISP	DVD-RAM	19 in	
Intel	1.2-ABC	HP	MS	256	40	256	DVD-RAM	19 in	
AMD	1.2-ABC	IBM	MS	256	40	256	DVD-RAM	19 in	
AMD	1.2-ABC	Dell	MS	512	60	256	DVD	19 in	
AMD	1.2-XYZ	Gateway	MS	512	60	256/ISP	DVD	19 in	
AMD	1.8-XYZ	HP	MS	256	60	256/ISP	DVD	19 in	
AMD	1.8-XYZ	IBM	Linux	256	60	1.2mbs	DVD-RAM	21 in	
Intel	1.8-XYZ	Dell	Linux	256	80	1.2mbs	DVD-RAM	21 in	
Intel	1.8-XYZ	Gateway	Linux	512	80	1.2mbs	DVD-RAM		
Intel	2.4-ABC	HP	Linux	512	80	1.2/ISP	DVD-RAM	21 in	
Intel	2.4-ABC	Sony	MS	512	120	1.2/ISP	DVD	21 in	
AMD	2.4-ABC	Sony	MS	1.2	120	1.2/ISP	DVD	21 in	

Quantity - Discounts - 2-5, 5-9, 11-19, 21-29, 30-99, 100-499, 500-1999, etc.

## Fig. 66: Examples of Categories of Multi-item Bundles

- 1. Computer Hardware configurations RAM, HDD, CPU, monitor
- 2. Computer Hardware& Software
- 3. Computer Hardware & Services
- 4. Office equipment computer, printer, copier, fax, phone
- 5. Telephone equipment & services local and long distance
- 6. Telecom capacity rev. maximization across demand cycle
- 7. Electronic equipment A/V combinations & software accessories
- 8. Photo equipment camera, lenses, accessories, film, digital media
- 9. Airline tickets time constraints to sell multiple seats to maximize revenue
- 10. Machines, machine parts, machine accessories
- 11. Cars/trucks & accessories
- 12. Wardrobe combinations, pants, shirts, coats
- 13. Real Estate contiguous properties
- 14. Communications spectrum contiguous properties
- 15. Gems
- 16. Railroad & trucking scheduling
- 17. Art, antiques, rugs, etc.
- 18. Housing combinations
- 19. Intellectual Property combinations
- 20. Pharmaceuticals
- 21. Chemicals

Fig. 67: S-ITA System Architecture

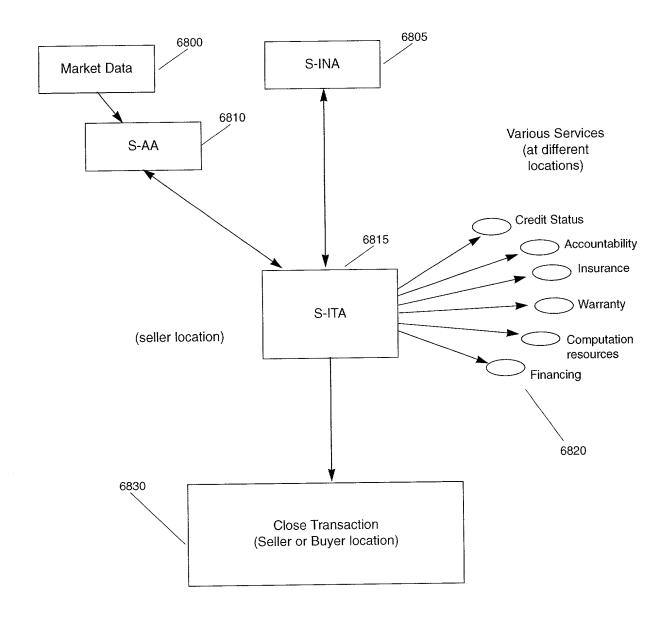


Fig. 68: S-ITA Operation

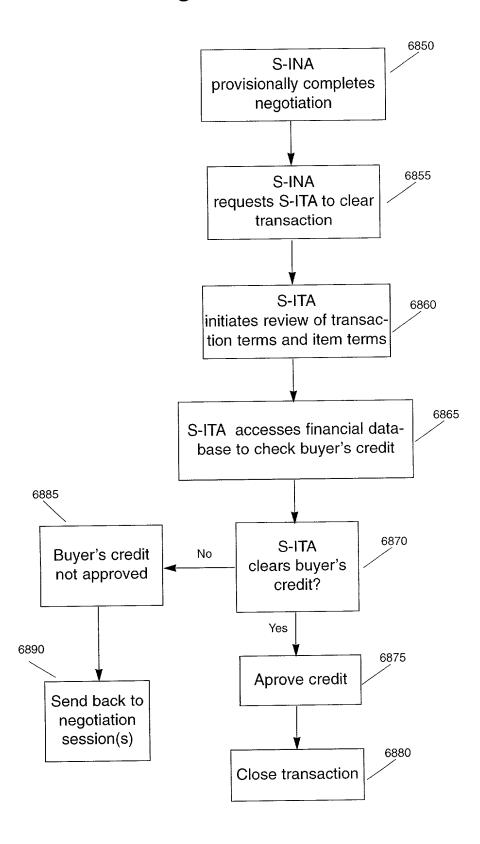
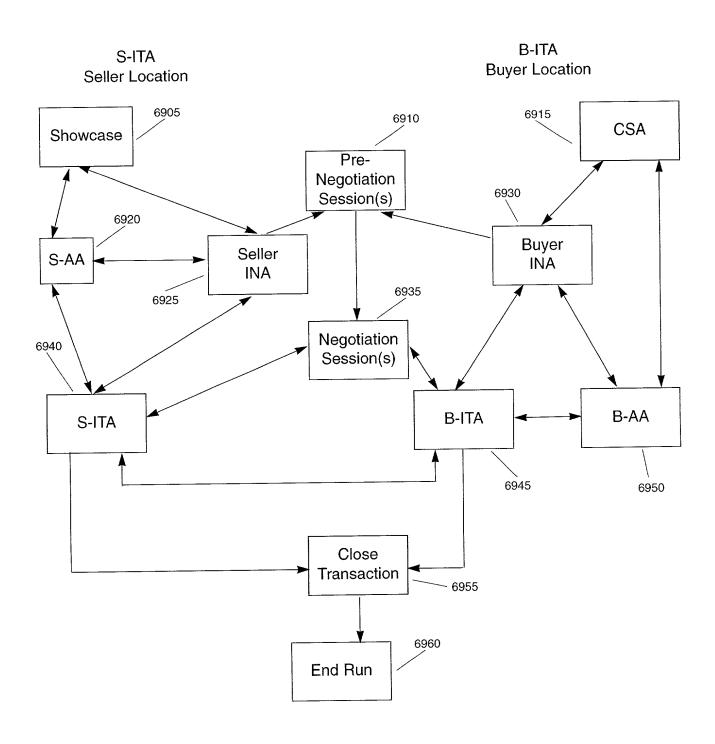


Fig. 69: S-ITA and B-ITA System Process in Final Negotiation with One Seller



## Fig. 70: ITA Service Categories: Buyer & Seller Roles

s – ITA Services	<u>b – ITA Services</u>	<u>dual – ITA Services</u>	
<u>Info.</u>	<u>Info.</u>	<u>Info.</u>	
AA functions	AA functions		
Superscore	Info about market, companies.,		
Accountability	economy, industry,		
Credit info.	products, etc.	<u>Services</u> Compliance – legal	
<u>Services</u>	<u>Services</u>	Compliance – tax	
Compliance – legal	Promotion discounts	RMO's	
Compliance – tax	Warranty	finance/credit	
RMO's	Insurance	payment processing	
finance/credit		Fulfillment –	
payment processing		shipping/tracking	
Fulfillment – shipping/tracking		due diligence	
due diligence	4	escrow	
		report generator	
escrow		post-sale feedback	
report generator			
post-sale feedback			

#### Fig. 71: ITA Services

Accountability index

prior experience online credit score & credit check

Financial credit module

- matching buyer with appropriate lender

Contracting module

Compliance module Legal compliance Federal/state/international rules

Tax compliance

International customs compliance

Risk management options

Payment processing module

- method of payments
- billing/invoice
- financial clearing and account crediting

Shipping/ delivery terms/tracking

Warranty Info & conditions

Insurance risks

Bookkeeping & accounting function

Due diligence

**Escrow process** 

Report generator

Accelerated processing for high rated customer Post sale feedback

7105 B-INA Metaagent 7110 7120 7115 B-INA Micro-agent 1 B-INA Micro-agent 2 B-INA Micro-agent 3 launched for specific launched for specific launched for specific negotiation session at negotiation session at negotiation session at S-INA -2 location S-INA -3 location S-INA -1 location 7130 7135 Negotiation session at remote location Negotiation ses-Negotiation session at remote sion at remote location location 7145 7125 B-INA at buyer home or remote location 7150 Winner determination at buyer home 7155 Mutual agreement: 7160 S-INA3 & B-INA Close sessions for 7165 S-INA1 & S-INA2 no S-ITA3 complete deal? yes 7170 End session

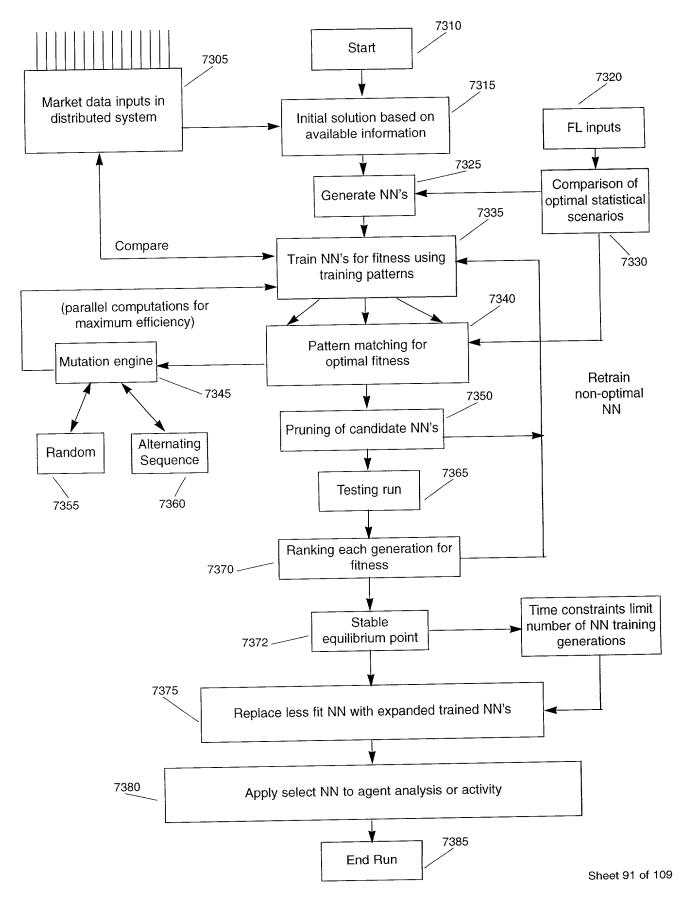
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Fig. 72: B-INA Micro-agents with Mobility

Fig. 73: Genetic Algorithms Applied to Multi-Agent **System** 7205 7210 Start Market Data Inputs in distrib-7215 uted system Search for optimal solution 7220 7223 7225 7228 Generate set of candidate solutions based on Pattern matching end Randomized available information mutation yes engine 7230 Match candidate 7235 Create new generations of candidate solusolutions with tions based on multi-factorial mutations market data Breed 7240 new generation of Produce candidate variants using operators candidate on surviving candidates solutions 7245 Evaluate candidate solutions according to efficiency criteria Decide which candidate solutions will be kept Discard or discarded by testing 7255 7250 7260 Winner determination by using most updated criterion 7270 7265 7275 Solution results 7280 Sub-optimal Ranking of each genera-Optimal solution solutions within tion of candidate solutions relative to all specified constraints candidates available for fitness & trade-offs Apply algorithm to agent 7285 analysis or activity 7290 . End Run

Sheet 90 of 109

Fig. 74: Neural Networks Applied to Multi-Agent System



7505 Data Inputs 7510 7520 7515 Induction Regression Rule Based Decision **Analysis** Learning Trees 7530 7525 Pruning by matching Organizing Models what works -Scope 7535 - Accuracy - Missing values, Heuristic Exceptions & operational **Errors** rules 7545 7555 Relearning 7550 Forecasts Scenarios 7565 7560 No % Yes % 7570~ Apply to agent analysis or activity 7575 ~ End run Sheet 92 of 109

Fig. 75: Genetic Programming System Process

Fig. 76: Genetic Programming Learning Schemas

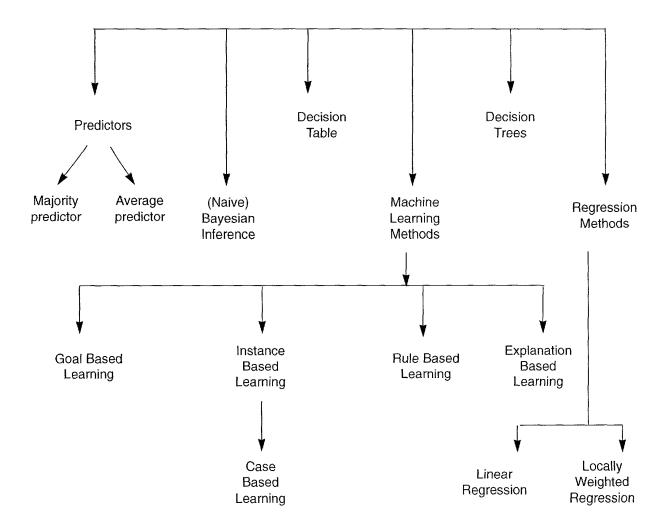


Fig. 77: Evolutionary Computation Applications to Agents

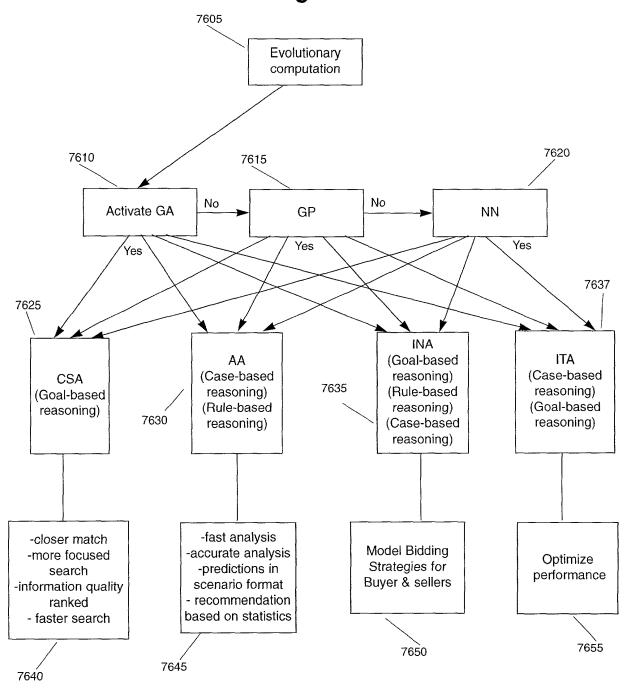


Fig. 78: Al Applied to Agency in a Distributed System

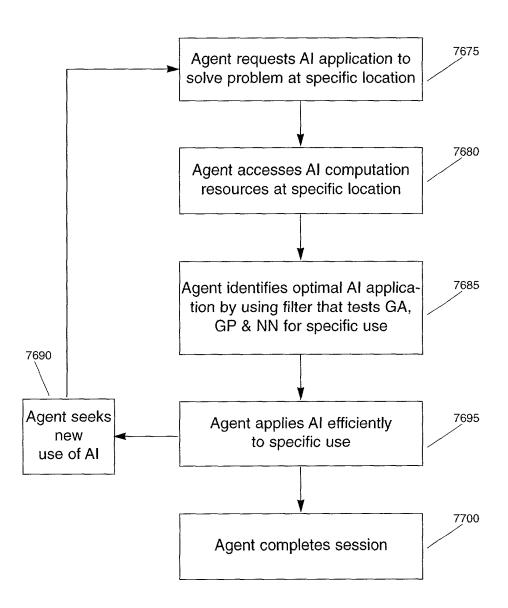


Fig. 79: Evolutionary Computation Architecture and AA/INA Applications

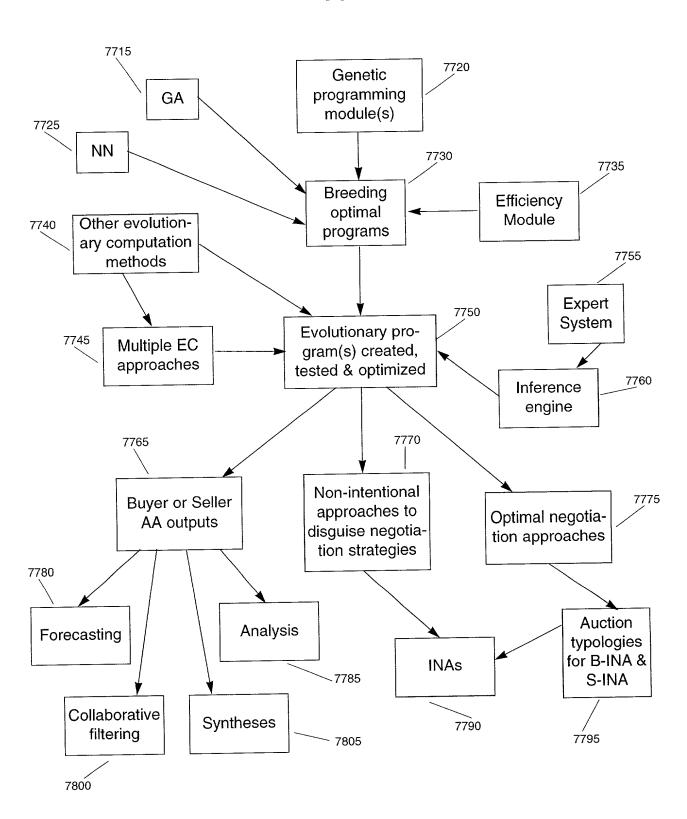


Fig. 80: Layered Al For Optimum Agent Mobility

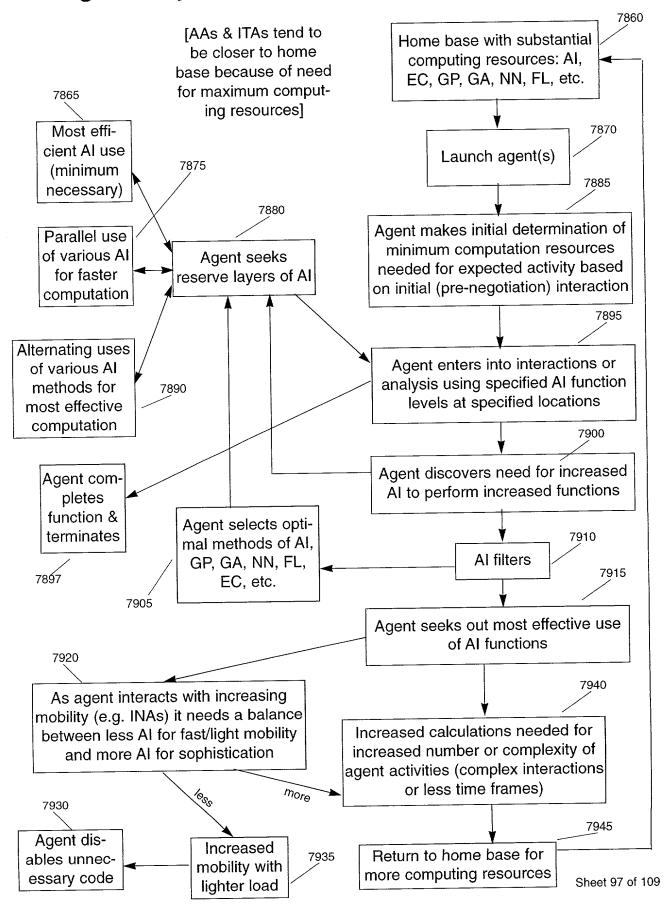
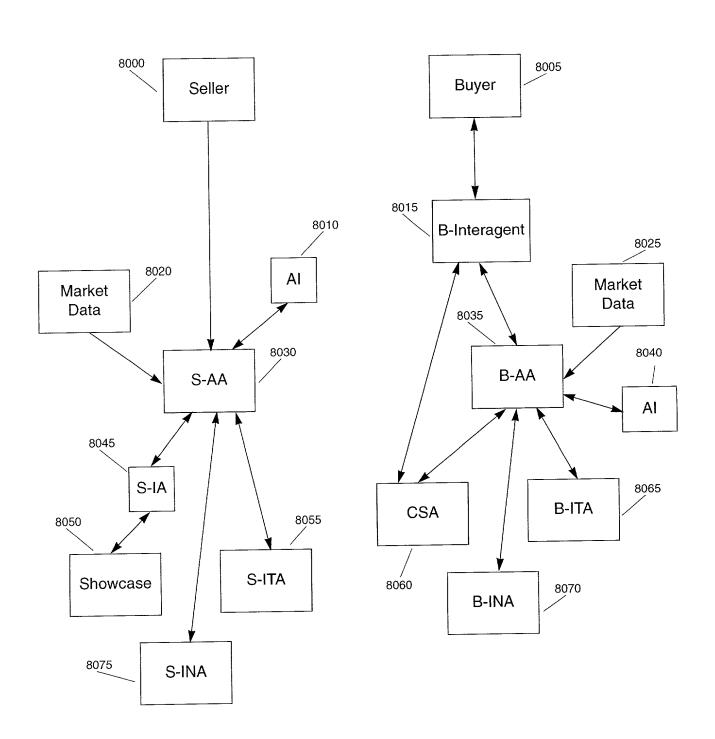


Fig. 81: Analytical Agent System Architecture
Buyer vs. seller viewpoints



8105 Market Data (various sources) 8115 Seller Analytical 8110 Agents Buyer Analytical Agents 8120 8135 8125 8130 Multi-attribute Expert Editorial Collaborative regression System retailing filtering analysis 8165 8160 8155 8145 8150 Third Mass personal-Synthesis party ization of data opinions Statistical Syntheses 8175 8180 scenarios Targeted Filter & synthesize Systematic informa-8170 data to buyer from tion Report initial parameters Forecasting Combining 8195 8190 Custom 8185 analysis report Recommendation report 8205 Advice report 8200

Fig. 82: Kinds Of Data Analysis & Syntheses

Fig. 83: Analytical Agent Data Flow Process

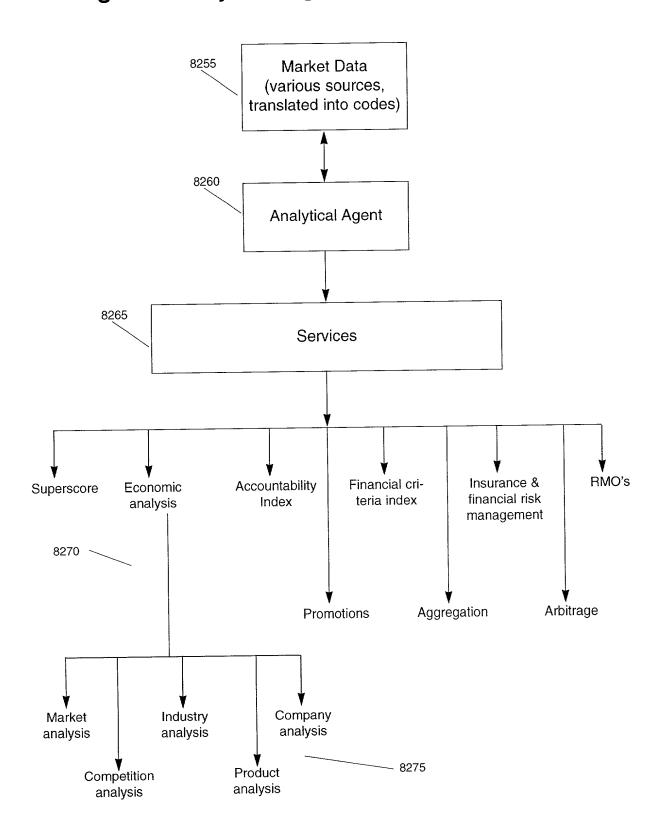


Fig. 84: Data Mining Approaches
CSA & AA interactions

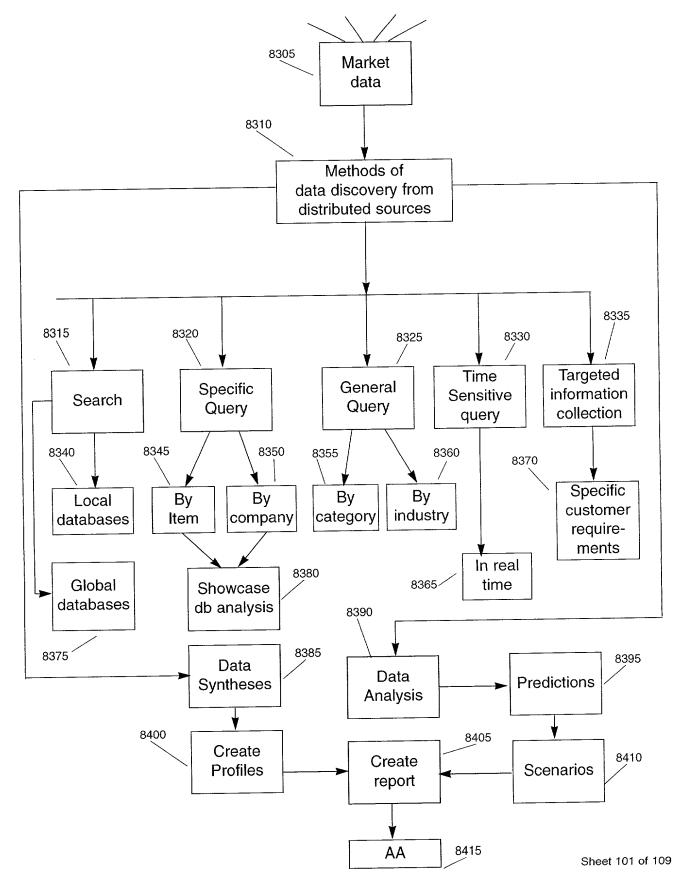


Fig. 85: Advanced Collaborative Filtering for Cross Marketing Recommendations

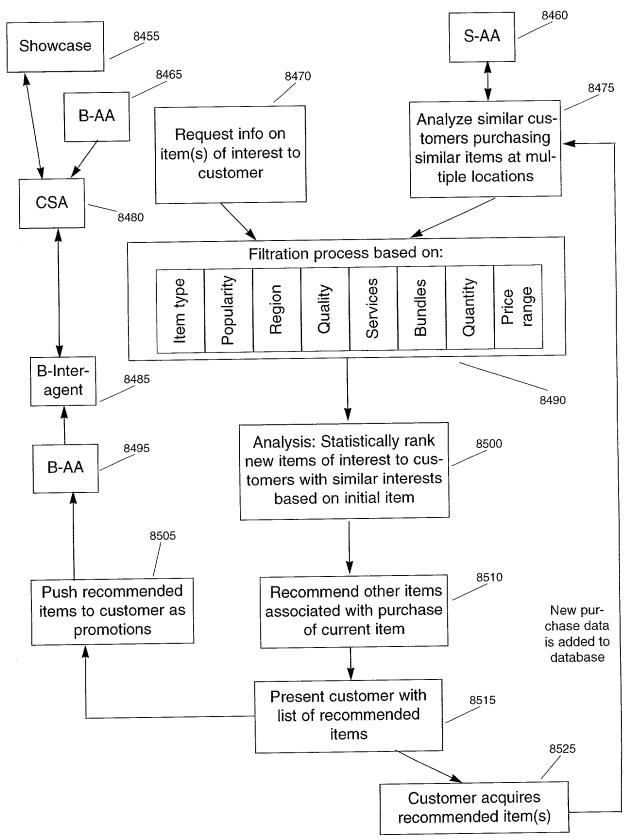
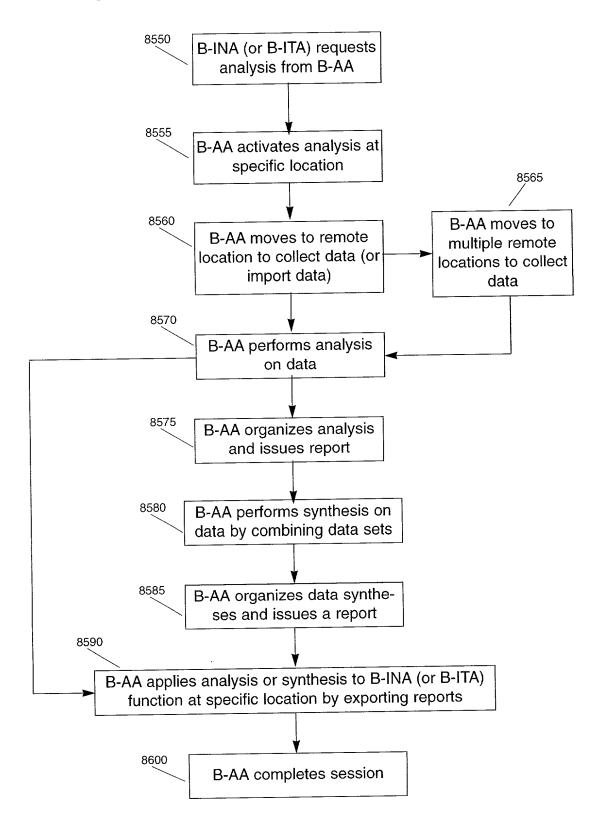


Fig. 86: B-AA Operations With Mobility



9

10

11

### Fig. 87: Super-Score System: Negotiated Variables

- 1. Object Description need reference to adaptable tables
- 2. Seller Description
- 3. Buyer Information
- 4. Buyer Credit Data
- 5. Finance opportunities credit
- 6. Seller Promotions
- 7. Risk Management Options
- 8. Market Data on Multiple Sellers & Buyers

1	2	3	4	5	6	7	8
14. After S 15. Quant	Quantity Quality to deliver ing code — G Sales rating G	code ach # signifi	es group c	ategory 1-1	00, 100-100	0 etc.	

12

13

14

16

15

#### Fig. 88: Economic/Market Analysis Variables

- 1. Industry Code
- 2. Industry Analysis
- 3. Product Analysis
- 4. Need Index of average prices for each main sector trends, changes
- 5. Prices relative to market averages
- 6. Intra-company analysis of products/services scope, growth rate change, etc. analysis of data
- 7. Probability scenarios of industry company
- 8. Broad Market Analysis (as service)
- 9. Economic indicators

1	2	3	4	5	6	7	8	9

## Fig. 89: Accountability Index System Variables

1. Bidding History a. % bid b. # of bids c. % of bids won d. # of bids won 2. Follow Up History a. # & re-negs b. # & returns 3. Credit History a. credit limit b. credit growth 4. Risk Factors a. fast changes outside 5. Flexibility ratio a. customer/seller as less rigid to accept deal 6. Tracking Pattern of Negotiation a. figuring into accountability index 7. Transaction Prior Experiences a. bidding history b. success c. problems 8. Follow through ratio 9. Accountability Index 10. Specify factors 11. Credit factors a. debt ratio to net worth b. paying on time c. use up to limits, floating debt d. credit limits e. # of accounts f. risk of default 12. Identify/authenticate agent/entity 13. Responsiveness to requests a. In time factor 5 3 2

12

10

9

11

13

## Fig. 90: Financial Criteria Index System

#### 30+ Digit Code

- 1. Net Worth
- 2. Income
- 3. Cash Flow
- 4. Level of Debt to net worth
- 5. Public records
- 6. Value of assets
- 7. How much credit limit is used
- 8. How often up to (or over) limit
- 9. Financial Criteria factors
- 10. Length of credit accounts
- 11. Credit Limit
- 12. Unsecured vs. Secured debt
- 13. Derogatory Credit over limit past due
- 14. Number of moves
- 15. Frequency of Place
- 16. Final Index Number to put in Super Score

1			 4	<u></u> 5	6	7	8
'	_	Ü	·	-			
9	10	11	12	13	14	15	16

### Fig. 91: Insurance Risk Factors

- 1. Use of Stats to establish rates
- 2. Kinds of losses specified
- 3. Claim-Adjustment Procedures
- 4. Claims Procedures
- 5. Errors
- 6. Omissions
- 7. Fraud
- 8. Accident
- 9. Premium Accounts
- 10. Limits/amounts of insurance
- 11. Full vs. Partial losses
- 12. Entity past record of claims
- 13. Costs of losses
- 14. Risks of specific events
- 15. Risk of limited loss
- 16. Risk of total loss

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

#### Fig. 92: List Of Services

- 1. ITA (Transactions)
  - a. Actual banking services
  - b. Aggregation (for better deals)
  - c. Insurance
  - d. Warranties
  - e. Payment Processing
  - f. Tax Collection & Payments
  - g. Escrow
  - h. Due Diligence
  - i. Legal, tax, customs
  - j. Compliance
  - k. Accounting
  - I. Shipping/delivery
  - m. Delivery tracking
  - n. Post-sale reporting
- 2. AA (Analysis)
  - a. Economic analysis
  - b. Market/industry analysis
  - c. Company, product & service analysis
  - d. Financial & credit analysis
  - e. Accountability Indices
  - f. Superscore
- 3. Risk Management Options
  - a. Penalties for sellers not fulfilling by specified time
  - b. Risk priorities order of preferred risks
  - c. Arbitrage penalties
  - d. Option swaps (exchanging opposing kinds of risks)
  - e. Dynamic pricing of risks based on peak/low risks environment
  - f. MTO Penalties
  - g. JIT Penalties
  - h. Risk Sharing

#### 4. Promotions (CSA)

- a. Discounts
- b. Aggregation (group discounts)
- c. Promotional guarantees
- d. Promise to provide item by specific time
- e. Quality increase offer
- f. Bundling products & services

#### 5. Insurance Risk Management

- a. Liability (product/service, business, individual)
- b. Dynamic pricing based on peak risks
- c. E&O Fraud risks
- d. Risk of event loss
- e. Re-insurance Insurance risk sharing
- f. Accident risks
- g. Degrees of losses

#### 6. Financial Risk Management

- a. Credit analysis /buyer, seller
- b. Secured debt kinds of assets
- c. Unsecured debt
- d. Structured fin.-by asset category (securitization of assets/debt)
- e. Packaging debt
- f. Packaging Ins. & Fin. Opportunities

#### 7. Additional Services

- a. Bundling products &/or services
- b. Customized orders
- c. Mass-customization
- d. Just-in-time items
- e. Aggregation of bundles
- f. Arbitrage of items & bundles
- g. Computation resources
- h. Bandwidth resources